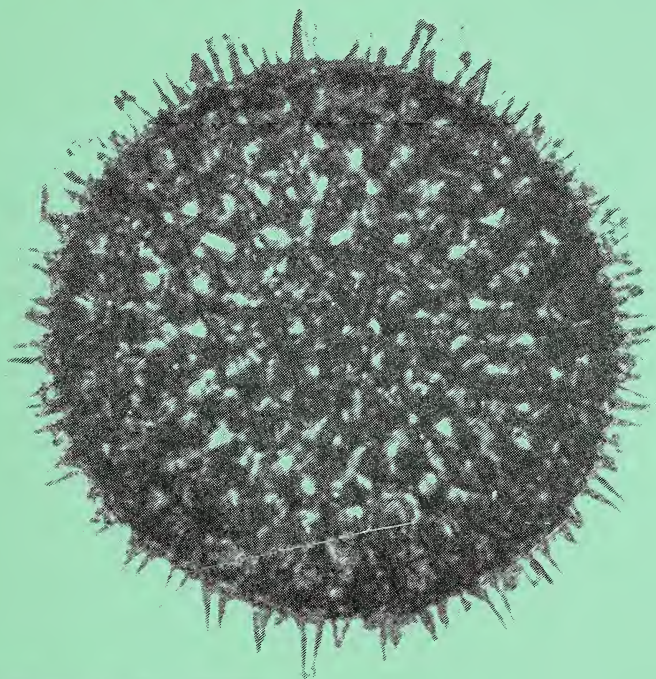






The Glasgow Naturalist



Pollen grain of Common
Mallow from sewage —
impregnated sediment in a
Roman ditch at Bearsden
(Diameter 0.12mm).

Volume 22

**Part 1
1991**



The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow, the University of Strathclyde or the Glasgow Art Gallery and Museum.

The present rates of subscription per annum are: for Ordinary Members, £8; for Junior Members, £5; for Family Members, £2; and for School Members, £1. Further information regarding the Society's activities and membership application forms are obtainable from the *General Secretary*:

C/O NATURAL HISTORY DEPARTMENT,
MUSEUM & ART GALLERY,
KELVINGROVE,
GLASGOW, G3 8AG.

The Glasgow Naturalist

Published by the Glasgow Natural History Society
ISSN 0373-241X

February 1991
Price £5.00

Edited by R. M. Dobson with the assistance of J. H. Dickson, R. H. Dobson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Clapham, A.R., Tutin, T. G. & Warburg, E. F. 1981. *Excursion Flora of the British Isles*, Ed. 3. Cambridge.

All communications on editorial matters should be sent to:

Dr R. M. DOBSON,
ZOOLOGY DEPARTMENT,
UNIVERSITY OF GLASGOW,
GLASGOW G12 8QQ.

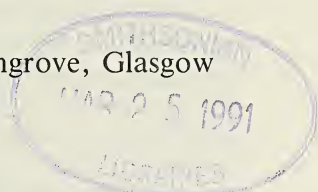
A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

William Buckham Lorrain, amateur Malacologist and first Vice-President of the Natural History Society of Glasgow

F. R. WOODWARD

Art Gallery & Museum, Kelvingrove, Glasgow
G3 8AG.



William Buckham Lorrain was the son of Dr William Lorrain Snr., Rector of the Old Grammar School, Glasgow. William Jnr. entered the University of Glasgow in about 1822, but terminated his studies in September 1823 to go to sea. As apprentice seaman to Cropper, Benson & Co. of Liverpool, he sailed from that city on 29th September 1823 aboard the *Bengal* bound for Calcutta where he arrived on 20th February 1824. During the return voyage the ship put in at St. Helena for water and William collected samples of the now extinct land snails from that island which are preserved in the Thomas Gray collection at Kelvingrove.

Following this interlude William returned to his studies, was awarded his M.D. by Glasgow University in 1829, and followed a career as "Physician and Surgeon" at a sequence of addresses in what was then the West end of the city (*i.e.* Sauchiehall Street and Hope Street).

In the late 1840s William became acquainted with several like-minded individuals interested in various branches of natural history in Glasgow, such as Thomas Gray (1820-1910), his brother John (1828-1878) whose chief interest was entomology, Robert Gray (1825-87) — author of *The Birds of the West of Scotland* (1871), his brother Archibald (died 1873), William Gourlie (died 1856) — botanist and conchologist, James Fraser — a geologist, Thomas Ferguson (died 1907) — entomologist and ornithologist, and his brother William (died 1904) — geologist and botanist. Their meetings usually took place in each other's houses, but on 2nd July 1851 the group met in the Thistle Coffee Room in Glasgow to consider the possibility of forming a society. On 9th July they established

formally the Natural History Society of Glasgow. At this meeting William Gourlie was elected president and another member, Dr John Scouler (1804-71), Honorary President.

At a subsequent meeting held on 7th October 1851 a committee consisting of Messrs. Gourlie, Fraser, Ferguson, Keddie and Lorrain was appointed to prepare suggestions for a constitution and rules for the new society. Their proposals, which were approved unanimously, included recommendations for the election of a Vice-President, the issuing of a diploma, and the election of corresponding members. On the motion of the President, seconded by Mr W. Ferguson, Dr Lorrain was unanimously elected Vice-President. At that same meeting William's passion for the Mollusca, particularly land shells, was apparent, because he delivered a paper entitled 'Some observations on the Helices of North America, by way of introduction to a paper on the habits of *Helix concava*'. He reported success in the rearing and propagation of several North American species of snail, and even released them in various (undivulged) parts of the country "... for the benefit of other naturalists".

The next meeting of the Society took place on 2nd December 1851, when Dr Lorrain read a paper 'On the structure and habits of *Helix concava*, a carnivorous snail of North America' which proved that he was a keen and meticulous observer:

"The beat of the *concava* heart I found to be thirty-five in a minute in its ordinary state, but as the cold weather advanced and the animal gradually withdrew into its shell the pulsation became proportionably slower and slower, and the body so opaque that I could no longer perceive the motion of the heart. In crawling I have often seen it stop short, fix itself by the posterior part of the foot (with which it forms a kind of disk, and adheres to the surface on which it crawls like a boy's sucker), stretch out its body to its full length, examine and feel all around, then resume its pace, and repeat this till it came in contact with any other *Helix*, upon whom it would immediately crawl, till it had its whole foot on its foe, when it would fix its disk firmly, then, advancing its mouth over the edge of the shell, seize the victim by the tender part near the respiratory opening. The animal attacked would instantly draw itself into its own shell, but be still followed by the persevering *concava*, who now elongates and forms his whole body into a kind of proboscis, and sucks or eats his prey into the very last whorl."

At the next meeting on 6th January 1852 he exhibited specimens of, and read a paper on *Nanina vitrinoides* based on observations he had carried out on a live example given to him by Mr Gourlie

about three years before.

When the Society met the following month in the Anderson University Building, at his own request Dr Lorrain's resignation from office as Vice-President was laid before the Society; this was necessitated by his intention to leave the country on account of ill health. His resignation was accepted, but the meeting placed on record their deep regret at the sudden removal of so valuable a member, and wished him a safe voyage and speedy recovery. His name was placed upon the list of corresponding members whilst his friend Thomas Gray was elected to replace him as Vice-President. It is also of interest that at this same meeting two other corresponding members were elected, one of whom was the famous Reverend Dr David Landsborough (1779-1854) of Saltcoats (see Clokie & Boney, 1979, for biographical details).

Dr Lorrain left Glasgow for Penang later that month and apparently continued to practise medicine, as is evidenced by a surviving letter to him from Tuankas Mohamed Akip:

“... my friend Doctor Lorrain who is very benevolent, endowed with universal knowledge, whose praiseworthy name is famous every where and generous to all friends and acquaintances. That on a former occasion my friend sent me some medicine and sent me medicinal chain through Baba Nip deean all which have safely arrived, I became very happy on receiving the same from my friend and my mind is very anxious to meet my friend once personally”.

Although he does not appear to have returned to Glasgow, it is clear that William Lorrain remained in contact with the Society. For example, Mr Gourlie exhibited at a meeting on 6th April 1852 a specimen of *Unio mississippiensis* Lea, sent by Joseph Clark of Cincinnati to Dr Lorrain. In a letter (*circa* 1854) to his friend and collaborator Mrs Margaret Gatty (1809-73), the Reverend Dr Landsborough wrote:

“But what do you think my first interruption was? The arrival of a box of American fresh-water shells, magnificent specimens — 36 in number chiefly *Unios*, from Dr Lorrain who has gone to Penang and who writes for directions how I preserve seaweeds”.

The shells in question are now preserved in the Dr D. Landsborough Collection at the Dick Institute at Kilmarnock. At a meeting of the Natural History Society of Glasgow on 26th June 1855, Mr Gourlie exhibited a fine specimen of the King Crab,

two eggs of a Crocodile, the molluscs *Auricula* and *Cerithium telescopium*, as well as several other natural history objects sent to him by Dr Lorrain from Penang.

During his lifetime William amassed a fine collection of land shells which were illustrated in a beautifully executed series of drawings by his friend and subsequent beneficiary, Thomas Gray (1840). The material included numerous rare species undescribed at that time, and he was in active communication with some of the leading experts of the day. Three species were named in his honour: *Rhaphaulus lorraini* Pfeiffer 1856a, *Bulimus lorraini* Pfeiffer 1856b, and *Clausilia lorraini* Menke 1856. The collection was gifted to the Art Gallery & Museum, Glasgow in 1910.

Dr William Lorrain is thought to have died at Hong Kong on 27th August 1857.

Acknowledgments

My sincere thanks to the staff of the Special Collection Section, University of Glasgow Library for access to the books and manuscripts in their charge, to R. Sutcliffe for information concerning the early Minute Books of the Society, and to G. Hancock for helpful comments on the various drafts of this paper.

References

- CLOKIE, J. J. P. & BONEY, A. D., 1979. David Landsborough: an assessment of his contribution to algal studies, *Glasg. Nat.* 19: 443-452.
- DANCE, S. P. & WOODWARD, F. R., 1986. *Thomas Gray, Glasgow's Shell Artist*. Glasgow Museums and Art Galleries.
- GRAY, T., 1840. *Drawings of Shells in the Collection of Dr W. B. Lorrain*. Unpublished manuscript.
- MENKE, K. T., 1856. Drei neue Landschnecken. *Malakilogische Blätter* 3: 68-69.
- PFEIFFER, L., 1856a. Descriptions of twenty-five New Species of Land Shells from the Collection of H. Cuming, Esq. *Proc. Zool.-Soc. London*: 32-36.
- PFEIFFER, L., 1856b. Descriptions of fifty-eight New Species of Helicea from the collection of H. Cuming, Esq. *Proc. Zool. Soc. London*: 324-336.
- WOODWARD, F. R., 1990. Dr William B. Lorrain and St. Helena's endemic land shells. *Hawaiian Shell News* (in press).

Spiders From Wallacebank Wood, Stirlingshire

S. I. BALDWIN

Royal Museum of Scotland, Chambers Street,
Edinburgh EH1 1JF.

Wallacebank Wood (Stirlingshire, V.C. 86: National Grid Ref. NS8484) is managed by the Scottish Wildlife Trust and is situated within the grounds of Glenbervie Golf Club (Scottish Wildlife Trust 1988). It is a 16 hectare semi-natural woodland planted about 1830 and the largely closed canopy contains beech, oak, Scots pine and spruce. Smaller trees including alder, birch and hazel are present and the shaded field layer contains wood anemone, bluebell, dog's mercury and wood millet. A small stream bisects the wood. In the damper open areas are mosses broken up by grass tussocks and horsetail. A sampling programme was undertaken in 1986/87 to investigate the spider fauna of the area.

Methods

Visits to the wood were made at monthly intervals from November 1986 to October 1987. Methods of collecting included beating tree foliage, sweep netting, stone turning and the examination of bark, leaf litter and moss. Ten pitfall traps were set in April along the eastern boundary amongst grass and wood anemone beneath a beech and oak canopy. The sampling units were plastic traps (diameter 9cm, volume 330ml) set 2-3m apart. The traps were in position for ten days.

Spiders were identified using named material in the reference collections of the Royal Museum of Scotland and Locket & Millidge (1951, 1953), Roberts (1985, 1987) and Wanless (1971). Certain specimens were sent to Dr Peter Merrett for confirmation of identity. Nomenclature and arrangement within families follows Roberts (1987). When species were recorded on only one or two occasions actual capture dates are given.

Results and discussion

Seventy-seven species were found and are listed below with details of their frequency and the habitats from which they were recorded (*indicates habitat type from which most records were obtained). As anticipated, the different habitats produced a varying number of species: under stones 9 species, tree canopy 9, under bark 12, pitfall traps 16, field layer 18, leaf litter 32 and moss 41 species. The pitfall traps produced 16 species of which two are new county records. Of the 87 adult specimens trapped 79% were males.

The surprising apparent scarcity of all araneids, *Tetragnatha* species and of *Linyphia triangularis* possibly reflects the paucity of open areas and of accessible canopy in the habitat.

The site produced one species new to Scotland, *Cicurina cicur*, and eight others new to Stirlingshire (V.C. 86) including *Walckenaera obtusa* and *Meioneta beata*, all from the field layer.

List of species

AMAUROBIIDAE

Amaurobius fenestralis (Stroem). 1♂ 8+, under bark* and stones. Adults Sept. to April.

OONOPIDAE

Oonops pulcher Templeton. 2♀, under bark, 28.ix.87.

SEGESTRIIDAE

Segestria senoculata (Linnaeus). 2♀, under bark and stones, 6.xi.86 and 28.iv.87.

GNAPHOSIDAE

Haplodrassus signifer (C. L. Koch). 2♀, moss 28.v.87 and 29.x.87. New to Stirlingshire.

Micaria pulicaria (Sundevall). 1♀, beech litter, 31.iii.87.

CLUBIONIDAE

Clubiona lutescens Westring. 1♀, beech litter, 31.iii.87.

C. compta C. L. Koch. 1♀, beech litter, 1♂, oak canopy, 31.iii.87 and 28.ix.87.

C. diversa O. P.-Cambridge. 12♂ 12♀, moss. Adults July to April.

Agroeca proxima (O. P.-Cambridge). 1♀, moss, 28.ix.87.

ZORIDAE

Zora spinimana (Sundevall). 1 immature, moss, 28.v.87.

THOMISIDAE

Xysticus cristatus (Clerck). 3♂ 2♀, moss, April and Aug.

Oxyptila trux (Blackwall). 2♂, moss, 28.iv.87.

SALTICIDAE

Neon reticulatus (Blackwall). 2♂, 2♀ moss. Adults April to July.

LYCOSIDAE

Pardosa monticola (Clerck). 2♂, pitfall trap, 18-28.iv.87. New to Stirlingshire.

P. pullata (Clerck). 4♀, moss. Adults May to Oct.

Alopecosa pulverulenta (Clerck). 3♀, moss. Adults April to July.

Trochosa terricola Thorell. 3♂, pitfall traps, April; ♀ moss, July.

AGELENIDAE

Cicurina cicur (Fabricius). 1♀, under stones, 6.xi.86. New to Scotland (Baldwin, 1987).

Cryphoea silvicola (C. L. Koch). 5♂ 6♀, under bark*, beech litter, pitfall traps. Adults Oct. to April.

THERIDIIDAE

Theridion pallens Blackwall. 1♂ 1♀, oak canopy, 28.ix.87.

Enoplognatha ovata (Clerck). 1♀, beech litter, 28.iv.87.

E. thoracica (Hahn). 1♂, moss, 28.iv.87. New to Stirlingshire.

Robertus lividus (Blackwall). 3♂ 7♀, beech litter, moss and under stones. Adults all year.

TETRAGNATHIDAE

Pachygnatha clerki Sundevall. 1♀, moss, 28.ix.87.

P. degeeri Sundevall. 3♂ 1♀, moss and field layer, Sept. and Oct.

P. listeri Sundevall. 11♂ 9♀, pitfall traps*, beech litter, moss and field layer. Adults Sept. to April.

METIDAE

Meta segmentata (Clerck). 18♂ 20♀, field layer and canopy. Adults, Sept to April.

LINYPHIIDAE

Ceratinella brevipes (Westring). 2♀, moss, 28.ix.87.

C. brevis (Wider). 3♂ 1♀, beech litter, field layer, pitfall traps. Adults Sept. to April.

Walckenaera obtusa Blackwall. 7♂, pitfall traps, 18-28.iv.87. New to Stirlingshire.

W. antica (Wider). 1♂ 6♀, moss. Adults April to Oct. New to Stirlingshire.

W. cuspidata (Blackwall). 1♂ 4♀, moss, beech litter and pitfall trap. Adults March and April.

W. acuminata Blackwall. 3♀, moss and beech litter. Adults March to Aug.

Dicymbium nigrum (Blackwall). 2♂ 3♀, moss, March.

Gonatium rubens (Blackwall). 3♀, moss, March and Oct.

G. rubellum (Blackwall). 3♀, pitfall traps and beech litter, April and Sept.

Maso sundevalli (Westring). 2♀, beech litter, 6.xi.86, 17.ii.87.

Pocadicnemis pumila (Blackwall). 2♂, moss, 28.iv.87 and 28.v.87. New to Stirlingshire.

- Pelecopsis parallela* (Wider). 2♂ 2♀, moss, Oct.
Cnephalocotes obscurus (Blackwall). 5♂ 5♀, moss. Adults April to Oct.
Tapinocyba pallens (O. P.-Cambridge). 3♂ 13♀, moss* and beech litter. Adults all year.
Thyreosthenius parasiticus (Westring). 1♂ 4♀, under bark* and stones. Adults Sept. to April.
Monocephalus fuscipes (Blackwall). 31♂ 41♀, moss*, beech litter and pitfall traps. Adults all year.
Gongyliidiellum vivum (O. P.-Cambridge). 3♂ 2♀, moss. Adults to Sept.
Savignya frontata (Blackwall). 5♂ 9♀, moss, beech litter, field layer and canopy. Adults Sept. to March.
Diplocephalus cristatus (Blackwall). 1♂ ♀, moss, 28.iv.87.
D. latifrons (O. P.-Cambridge). 3♂ 7♀, beech litter*, under bark and stones. Adults Sept. to March.
D. picinus (Blackwall). 3♀, beech litter, July and Oct.
Erigone dentipalpis (Wider). 1♀, field layer, 28.v.87.
E. atra (Blackwall). 3♂ 2♀, moss, beech litter, field layer and canopy. Adults Oct. to May.
Porrhomma pygmaeum (Blackwall). 4♂ 8♀, beech litter*, moss and field layer. Adults Sept. to April.
Meioneta beata (O. P.-Cambridge). 1♀ moss, 28.iv.87. New to Stirlingshire.
Microneta viaria (Blackwall). 105♂ 83♀, beech litter*, moss and pitfall traps. Adults all year.
Centromerus sylvaticus (Blackwall). 11♂ 19♀, beech litter*, moss, under bark and pitfall traps. Adults Aug. to April.
C. prudens (O. P.-Cambridge). 9♀, beech litter, 31.iii.87.
C. dilutus (O. P.-Cambridge). 2♂ 1♀, beech litter. Adults March and Oct.
Centromerita concinna (Thorell). 2♂ 1♀, beech litter and moss, 6.xi.86 and 29.x.87. New to Stirlingshire.
Saaristoa abnormis (Blackwall). 1♂ 3♀, beech litter. Adults April to Sept.
Macrargus rufus (Wider). 9♂ 30♀, beech litter*, moss, under bark and pitfall traps. Adults all year.
Bathypantes gracilis (Blackwall). 2♂, moss, 28.v.87.
Diplostyla concolor (Wider). 5♂ 1♀, beech litter, moss, pitfall traps and under stones. Adults March to Nov.
Draptisca socialis (Sundevall). 3♂ 5♀, canopy, field layer and under bark. Adults Aug. to Oct.
Labulla thoracica (Wider). 1♀, under bark, 29.x.87.
Lepthyphantes minutus (Blackwall). 3♀, field layer and under bark. Adults Sept. to Nov.
L. alacris (Blackwall). 2♂ 4♀, beech litter, moss, field layer and pitfall traps. Adults April to Nov.
L. tenuis (Blackwall). 6♀, beech litter, moss, field layer and canopy. Adults July to Oct.
L. zimmermanni Bertkau. 9♂ 7♀, beech litter*, moss, under bark and stones and pitfall traps. Adults Sept. to April.
L. cristatus (Menge). 2♂ 7♀, moss, field layer and pitfall traps. Adults Sept. to April.
L. mengei Kulczynski. 2♂ 1♀, moss. Adults April and Oct.
L. tenebricola (Wider). 1♂, field layer, 28.v.87.
L. pallidus (O. P.-Cambridge). 2♂, beech litter and under stones, 6.xi.86 and 31.iii.87.

Helophora insignis (Blackwall). 16♂ 21♀, field layer*, canopy* and beech litter. Adults Aug. to Feb.

Linyphia triangularis (Clerck). 1♀, field layer 28.ix.87.

L. hortensis Sundevall. 4♀, field layer. 28.v.87.

Neriere clathrata (Sundevall). 1♀, beech litter, 28.ix.87.

N. peltata (Wider). 3♀, canopy and beech litter. Adults April and July.

Microlinyphia pusilla (Sundevall). 4♀, field layer, 28.v.87.

Acknowledgments

I am grateful to Dr Peter Merrett who checked the vice-county records and certain indentifications and to Dr Graham Rotheray for his advice and encouragement. Thanks go also to the Scottish Wildlife Trust, whose Falkirk Support Group manages the site, and the members and staff of Glenbervie Golf Club who kindly avoided me.

References

- BALDWIN, S. I. 1987. *Cicurina cicur* (Fab.) First Scottish Record. *Newsl. Br. arachnol. Soc.* 49:3.
- LOCKET, G. H. & MILLIDGE, A. F. 1951, 1953. *British Spiders I & II*. Ray Society, London.
- LOCKET, G. H., MILLIDGE, A. F. & MERRETT, P. 1974. *British Spiders III*. Ray Society, London.
- MERRETT, P. 1975. New County Records of British Spiders. *Bull. Br. arachnol. Soc.* 3(5), 140-141.
- MERRETT, P. 1982. New County Records of British Spiders. *Bull. Br. arachnol. Soc.* 8(1), 1-4.
- ROBERTS, M. J. 1985-87. *The Spiders of Great Britain and Ireland I. II & III*. Harley Books, Colchester.
- SCOTTISH WILDLIFE TRUST. 1988. *Reserves Handbook*.

Book Reviews

A Key to Case-bearing Caddis Larvae of Britain and Ireland

I. D. & B. WALLACE & G. N. PHILIPSON

Freshwater Biological Association Scientific Publication No. 51, 1990, 237pp., numerous illustrations. Paperback, ISBN 0 900386 49 5, ISSN 0367 1887, £16.00.

With the proviso that the habit of case building does not necessarily reflect evolutionary relationships, the authors proceed to provide keys to 12 families of caddis. These are all dealt with in sufficient detail to satisfy any student or freshwater ecologist wishing to identify samples to the species level with confidence except for one family. These are the hydroptilids, a group of tiny insects currently insufficiently studied to take identification beyond genus. (What an abundance of unknowns there is in the insect world.) Notes on collecting, preserving and examining precede description of larval morphology. These pages are essential reading, including warnings on colour changes after poor fixation or long storage in alcohol. Preliminary keys to families are followed by each family treated separately. A useful feature is the correlation between text and diagrams which avoids much annoying page turning while in use. The contribution of the F.B.A. (and others) to the production of keys for plants and animals is essential for the work of biologists. Long may they and their authors continue.

E. G. HANCOCK

Atlas of the Living World

DAVID ATTENBOROUGH, PHILIP WHITFIELD, PETER MOORE & BARRY COX

Wiedenfeld & Nicholson, London, 1989, 220pp., numerous photographs, diagrams and maps in full colour. Hardback, ISBN 0 297 79642 9, £19.95.

Despite the 'coffee table' size and style of presentation of this book it has a more than superficial content. A large number of topics are covered from the discussion of threatened species and habitats to pests and diseases. The layout of photographs, coloured drawings, diagrams and maps does not crowd out the text which is substantial and crammed with facts. There is a useful summary of endangered species of plants and animals, although this section will date rapidly. It has the general appearance of a spin off from a television series but as far as I know this is not the case. Perhaps this is imaginary because of the presence of David Attenborough's name in prominence on the cover. Inside, the authorship is clearly credited to the three others as Attenborough's contribution is limited to 5 two-page introductions to chapters. Such is the power of his media profile that the publishers use his name to help sell the book. It should not need this, as it is a good example of its kind. There are short summaries of topical issues such as acid rain, the greenhouse effect and ozone layer. There are appendices showing the world distribution of the 'successful' families of plants, mammals and birds and a list of titles for further reading. One might object to the use of this term 'successful' which is glibly defined as families with a large number of species and with a wide distribution. It would make an ideal present for a youngster with an interest in the natural world. The more experienced would probably find much of use too and similarly be pleased to receive it.

E. G. HANCOCK

Some Observations on Scottish Wildcats *Felis silvestris* based on the Results of Autopsies

D. J. JEFFERIES

Nature Conservancy Council, Northminster House,
Peterborough PE1 1UA.

Examination of carcasses can provide a considerable range of biological data on species of conservation interest. Studies based on wildcat *Felis silvestris* Schreber carcasses have included those on dimensions (Tetley, 1941; Kirk & Wagstaffe, 1943), diet (Hewson & Kolb in Kolb, 1977), parasite load (Burt *et al.*, 1980) and an examination of skull characters for signs of hybridisation with domestic cats *F. catus* L. (French *et al.*, 1988). Such wildcat material was readily obtainable in the past as, although uncommon, the species was regarded as a pest by game interests. This source of material should have ended with the placing of the species on Schedule 5 of the Wildlife and Countryside Act 1981 in 1988, thus giving it complete protection. Future studies building up a wider database on various aspects of biology will have to depend on carcasses obtained from accidental deaths such as road casualties. These are many fewer than those originally derived from game preservation (Road: Gamekeeping = 7:29; Burt *et al.*, 1980) so each further specimen will be valuable. The following notes, although referring to only three animals taken before legal protection, provide further interesting information from an area south and west of those used in the recent studies of Kolb (1977), Corbett (1979) and Burt *et al.* (1980). Information gained is compared with that from previous surveys and calculations made concerning dimensions by combining the data obtained from this and other sources.

The analysis of the organs of one individual for pollutants is the only one for this species to the author's knowledge, although the levels in other British Carnivora are known from many examples (e.g. badgers *Meles meles* (L.): Jefferies, 1969; otters *Lutra lutra* (L.): Jefferies *et al.* 1974).

Wildcats autopsied

A339 was a juvenile female road casualty found dead on the A828 road on the Benderloch peninsula (Strathclyde Region: Argyll and Bute) on 1 October 1973 (National Grid Ref: NM 918402). Meyer-Holzapfel (1968) showed that mean weights of 904 and 1081 g ($n = 7$) are achieved by female kittens of *F. silvestris* at 9 and 10 weeks respectively. Thus this animal of 975 g would be 9½ weeks old and so unweaned (Kolb, 1977). Birth date would have been around 28 July. May is considered to be the main month for births in *F. silvestris* (Kolb, 1977) but Millais (1904-06) noted births in assumed wildcats as late as August and September in the 19th century, possibly before the problem of hybridisation with feral domestic cats became serious following the reduction in the wildcat population. The only kitten obtained by Tetley (1941) weighed 454 g on 2 September 1938 and would have been born around 30 July.

6999 was an adult female trapped and shot at Finegand, Glen Shee (Tayside Region: Perth and Kinross) in March 1978 (Grid Ref: NO 143664).

7024 was an adult male snared in Bovain Wood, Glen Dochart near Killin (Central Region: Stirling) on 22/23 January 1982 (Grid Ref: NN 532303).

These cats were identified on the external characters given by Kolb (1977) and all three were within the area shown to be occupied by wildcats in the survey of 1983-1987 (Easterbee, 1988). The skulls of *A339* and *6999* were crushed at death and that of *7024* is with Dr Easterbee at NCC, Edinburgh.

Body weights and dimensions

The weights of *A339*, female *6999* and male *7024* were 0.975, 4.60 and 5.75 kg respectively. The adult body weights fall within the ranges reported for *F. silvestris* by Kirk & Wagstaffe (1943) and Kolb (1977). For comparison, Latimer (1936) reported the mean weights (\pm standard error) of domestic cats as males 2.82 ± 0.07 kg (52 animals) and females, 2.44 ± 0.05 kg (52 animals).

The nose-anus lengths of *A339*, *6999* and *7024* were 362, 565 and 628 mm, and their tail (to vertebrae) lengths were 166, 310 and 296 mm respectively, or 45.9, 54.9 and 47.1% of nose-anus lengths. Examination of relative tail length in *F. silvestris* and *F. catus* shows some anomalies in descriptive texts in that Millais (1904-06) refers

Table 1. The mean tail lengths of 121 wildcats related to their nose-anus lengths. Individual data for animals over 500 mm nose-anus length are derived from Tetley (1941), Kirk & Wagstaff (1943) and this paper. The overall mean tail lengths \pm standard errors for 108 males and 13 females are given in the text.

Size group based on nose-anus length in mm.	No. in group	Mean nose-anus length in group in mm.	Mean tail length in mm. (range)	Mean of tail length calculated as a percentage of nose-anus length (range)
MALES				
500-524	2	501.0	320.0 (302-338)	63.86% (60.4-67.3)
525-549	3	540.0	300.3 (298-305)	55.62% (55.2-56.5)
550-574	16	569.2	316.1 (292-330)	55.53% (51.1-58.1)
575-599	38	587.6	309.3 (210-342)	52.64% (35.6-59.2)
600-624	34	610.9	319.6 (274-350)	52.32% (45.1-57.4)
625-649	14	629.2	320.2 (290-370)	50.89% (46.0-58.7)
650-674	1	653.0	330.0	50.54%
FEMALES				
500-524	2	518.0	266.0 (260-272)	51.36% (49.9-52.8)
525-549	2	540.0	294.0 (257-331)	54.38% (48.0-60.7)
550-574	6	559.3	296.8 (270-316)	53.05% (49.1-55.1)
575-599	3	579.3	303.0 (293-311)	52.30% (50.9-53.8)

to the "short and bushy tail" of *F. silvestris* and Kolb (1977) refers to the tail of domestic cats being "long in proportion to the body" whilst that of *F. silvestris* is "less than half the head/body length". However, using the combined individual data from Tetley (1941), Kirk & Wagstaffe (1943) and this paper to calculate tail length as a percentage of nose-anus length (*i.e.* relative length) for 121 *F. silvestris* does not support these descriptions. Table 1 shows that the tail is very variable in length; *e.g.* from 290 to 370 mm in one of the male 25 mm nose-anus length groups. Also shown is that the rate of tail growth decreases after the nose-anus length reaches 500 mm, so that the relative tail length decreases with increased size of the animal. Further, for any one size group, the tail of the female is shorter than that of the male. The overall mean tail length for 108 male wildcats of mean nose-anus length 595.3 ± 2.5 mm is 315.1 ± 2.0 mm (mean percentage length $53.01 \pm 0.38\%$). Similarly the overall mean tail length for 13 female wildcats of mean nose-anus length 554.6 ± 5.9 mm is 293.1 ± 6.3 mm ($52.82 \pm 0.89\%$).

In addition use of the means provided for *F. silvestris* by Kolb (1977) results in similar relative tail lengths of 54.4% (26 animals) for males and 54.0% (16) for females. The figures for the present two adult wildcats fall within the ranges shown by the longer series (Table 1). The relative tail length of the kitten would be expected to be short and is similar to the one reported by Tetley (1941) (N/A 276 mm; tail 124 mm; 44.9%). In contrast to the wildcats, calculating the relative tail length of feral domestic cats *F. catus* from the means provided by Tabor (1983) shows 48.9% for males and 48.5% for females. In neutered domestic cats the tail is slightly longer at 51.8% and 51.7% respectively (Tabor, 1983). The same calculation using the mean data provided for 52 male and 52 female adult domestic cats by Latimer (1936) results in 51.1% and 49.6% respectively. These calculations, using various authors' data, would support the conclusion that the tail of the wildcat is on average relatively longer than that of the domestic cat. It is possible then that hybridisation may account for some of the variability in tail length and that the latter may perhaps be used as one of its indicators.

Organ weights

The liver, paired kidneys, spleen and heart (ventricles only) from each wildcat were weighed at dissection. The livers weighed 35.08 g (3.598% of body weight), 131.31 g (2.855%) and 124.65 g (2.168%) in A339, 6999 and 7024 respectively. The paired kidneys

from these three cats weighed 9.42 g (0.966%), 36.33 g (0.790%) and 46.67 g (0.812%). Similarly the spleen weighed 1.21 g (0.124%), 5.96 g (0.129%) and 7.49 g (0.130%) and the heart, 3.70 g (0.379%), 17.69 g (0.385%) and 22.34 g (0.388%). Examination of data provided by Latimer (1936, 1937) for domestic cats shows mean liver weights of 101.50 g (3.597%) in males and 88.61 g (3.624%) in females. The difference in relative organ weights between the wild and domestic cats may be due to differences in size rather than species differences.

Stomach contents

The diets of many wild mammals are ascertained by examination of their faeces. However, it is impossible to separate the faeces of wildcat and domestic cat with certainty so the examination of stomach contents of identified wildcats provides an alternative. The present three cats all contained identifiable remains which conform to those reported for 18 stomachs (from north east Scotland) by Hewson and Kolb (Kolb, 1977).

A339 contained the tail of a field mouse *Apodemus sylvaticus* (L.) with some fur. There was also the complete black foot and metatarsus of a large bird (75 mm from toe to hind claw), probably a corvid. No other bird bones were found; possibly indicating scavenging of carrion.

6999 contained the remains of two field voles *Microtus agrestis* (L.).

7024 had a full stomach containing flesh, a considerable amount of fur and part of the ear of a rabbit *Oryctolagus cuniculus* (L.). They weighed 248 g, which indicates the intake capacity for one meal at 4.3% of the body weight.

Length of alimentary canal

It has been known since 1756 that the hind-gut length of continental wildcats is much shorter than that of domestic cats, but few guts of Scottish wildcats have been measured. Schauenberg (1977) measured the hind-gut lengths of 42 adult male (mean 1481 mm) and 15 adult female (mean 1381 mm) continental wildcats and calculated an intestinal index (total length of intestines/length of head and body) (mean for males 2.626; females 2.665). The hind-guts of the present three Scottish wildcats were measured from the

pyloric end of the stomach to the anus (small and large intestines and rectum) and found to be 1220, 1165, and 1530 mm in A339, 6999 and 7024 respectively. The calculated indices were 3.37, 2.06 and 2.44 (*i.e.* similar to continental animals).

Latimer (1936, 1937) measured the head + body lengths of 104 adult American domestic cats and the lengths of their small and large intestines. In males of 521 mm the hind-gut length was 1704 mm (index: 3.27) whereas in the females of 509 mm it was 1583 mm (index: 3.11). In addition, Schauenberg (1977) measured 14 adult domestic cats (males and females) which had a mean hind-gut length of 1993 mm (index: 3.825). Thus the relative hind-gut lengths of these domestic cats are half as long again as those of adult wildcats. The relative gut length of the kitten A339 is likely to be longer than those of the two adults as it was unweaned with a high liquid diet. The kittens of both wild and domestic cats have high intestinal indices (3.582 and 4.669 respectively; Schauenberg, 1977).

Parasites

Opening of the guts showed the presence of one cestode and four nematodes at the pyloric end of the duodenum and stomach of A339 and three nematodes in the stomach of 7024. The adult tapeworm of A339 was identified as *Taenia taeniaeformis* (Batsch 1786), a species which has been found in domestic cats (West, 1988). The nematodes from A339 were two females and two larvae of *Toxocara*. Identification to species was impossible with this material but these were probably *Toxocara cati* (Schränk, 1788), the species of *Toxocara* commonly found in domestic cats. Those from 7024 were not identified. Burt *et al* (1980) carried out a detailed survey of the helminths of 37 wild, domestic and hybrid cats from Glen Tanar in Grampian and found *Taenia taeniaeformis* in 50% of *F. silvestris* (11/22), 91% of *F. catus* (10/11) and 75% of hybrids (3/4). All 36 cats (21 wild, 11 domestic, four hybrid) contained *Toxocara cati*. These infection rates in *F. catus* are much higher in the feral state than in the domesticated as Sloan (1961) detected *Taenia taeniaeformis* in only 3% of domestic cat faeces and *Toxocara cati* in only 20%. The source of both parasites for both cats would be the consumption of small rodents (West, 1988).

Residues of Pollutants

Organochlorines: – The liver and brain of A339 were analysed

Table 2 The concentrations of DDE (expressed in terms of wet weight and in extractable organ lipid) and the heavy metals, Mercury, Zinc, Copper and Cadmium found in various organs of wildcat A339. N/D = Not detected.

Organ	Extractable lipid (mg/g)	pp'-DDE		Heavy Metals (mg/kg dry weight)			
		mg/kg wet weight	mg/kg lipid	Hg	Zn	Cu	Cd
Liver	28.58	2.35	82.13				
Brain	86.22	1.36	15.83				
Liver				0.33	153.8	16.96	0.21
Kidney Cortex				0.29	159.4	11.64	N/D
Kidney Medulla				0.16	126.0	3.89	N/D

for organochlorine insecticides, their metabolites and PCB as part of a survey at that time. The technique used was as described by Jefferies *et al.*, 1973. No dieldrin or other insecticides or PCBs were found at analysable levels (limit of detection: 0.01 mg/kg). However, a considerable concentration of pp'-DDE, the main metabolite of pp'-DDT, was found in both liver and the brain (Table 2). This was higher than the arithmetic mean of 1.35 mg/kg w/w found in the livers of otters at that time (Jefferies *et al.*, 1974) but lower than that in badgers (3.27 mg/kg w/w) from agricultural south-east England (Jefferies, 1969). It shows that mammals in areas remote from intensive agriculture can become contaminated by global pollutants. It seems likely that the source of the DDE in that area would be the occasional avian prey. Small mammals, even in areas of high pesticide usage, usually have very low residues of organochlorines for most of the year (Jefferies *et al.*, 1973; Jefferies *et al.*, 1989), whereas birds normally carry higher concentrations. Thus Cooke *et al.* (1982) found that predatory birds feeding on birds contained more DDE than those feeding on mammals. Also, birds, being mobile, can "transport" residues from areas of high to areas of low insecticide usage. Organochlorine levels in young animals are not necessarily much lower than those in local adults (Jefferies & Hanson, 1988). DDE can pass into the young animal via the placenta and the milk so can be measurable long before weaning. DDE has a relatively low lethal toxicity, but can produce many detrimental sub-lethal effects (Jefferies, 1975).

Heavy metals: — Zinc and copper are essential elements, the levels of which are regulated by the body. Mercury and cadmium, both of which were present in small concentrations in A339 (Table 2), are toxic pollutants. Again, both may have arisen from avian prey. Mercury compounds are used as agricultural fungicides and cadmium may be present as an impurity in fertilizers. The percentages of water by weight in the liver, kidney cortex and kidney medulla were 75.9, 79.0 and 80.3, so the dry to wet weight concentration conversion factors for the figures in Table 2 are $\times 0.2411$, $\times 0.2102$ and $\times 0.1973$, respectively. Calculation (Jefferies & French, 1976) shows that even in Argyll this wildcat had accumulated a total body load of 18 micrograms mercury by 11 weeks.

It is not known how much, if at all, pollution may have affected the rate of recovery of the wildcat population of Scotland (Easterbee 1988), but cats have been found to be very sensitive to dieldrin and

many casualties occurred among domestic cats in the south following the usage of this material as a seed dressing in the 1950s and 1960s (Cramp & Conder, 1960; Cramp *et al.*, 1962). Dieldrin, although not found in A339, has been found in the past in golden eagles *Aquila chrysaetos* (L.) (Lockie *et al.*, 1969; Cooke *et al.*, 1982), probably from the consumption of sheep carrion.

Acknowledgments

I thank Miss L. Farrell, Mr P. Wormell and Mr J. Green for the three wildcat specimens and Mrs E. A. Harris and Dr R. A. Bray at the British Museum (Natural History) for identification of the parasites. I am grateful to Dr N. Easterbee for commenting on the manuscript.

References

- BURT, M. D. B., PIKE, A. W. & CORBETT, L. K. 1980. Helminth parasites of wildcats in north-east Scotland. *J. Helminthology* 54: 303-308.
- COOKE, A. S., BELL, A. A. & HAAS, M. B. 1982. *Predatory Birds, Pesticides and Pollution*. Institute of Terrestrial Ecology, Huntingdon.
- CORBETT, L. K. 1979. *Feeding ecology and social organization of wildcats (Felis silvestris) and domestic cats (Felis catus) in Scotland*. Unpublished Ph.D.thesis, University of Aberdeen.
- CRAMP, S. & CONDER, P. J. 1960. *The deaths of birds and mammals connected with toxic chemicals in the first half of 1960*. R. S. P. B., London.
- CRAMP, S., CONDER, P. J. & ASH, J. S. 1962 *Deaths of birds and mammals from toxic chemicals: January-June 1961*. R. S. P. B., Sandy, Bedfordshire.
- EASTERBEE, N. 1988. The wildcat *Felis silvestris* in Scotland 1983-1987. *Lutra* 31: 29-43.
- FRENCH, D. D., CORBETT, L. K. & EASTERBEE, N. 1988. Morphological discriminants of Scottish wildcats (*Felis silvestris*), domestic cats (*F. catus*) and their hybrids. *J. Zool., Lond.* 214: 235-259.
- JEFFERIES, D. J. 1969. Causes of badger mortality in eastern counties of England. *J. Zool., Lond.* 157: 429-436.
- JEFFERIES, D. J. 1975. The role of the thyroid in the production of sublethal effects by organochlorine insecticides and polychlorinated biphenyls, pp.131-230. In Moriarty, F., (ed.) *Organochlorine Insecticides: Persistent Organic Pollutants*, Academic Press, London.
- JEFFERIES, D. J. & FRENCH, M. C. 1976. Mercury, Cadmium, Zinc, Copper and organochlorine insecticide levels in small mammals trapped in a wheat field. *Environ. Pollut.* 10: 175-182.
- JEFFERIES, D. J. & HANSON, H. M. 1988. The Minsmere otter release and information gained from a detailed examination and analysis of the two casualties. *Otters, Journal of the Otter Trust* 2(1): 19-29.
- JEFFERIES, D. J., FRENCH, M. C. & STEBBINGS, R. E. 1974. Pollution and Mammals, pp.13-15. In *Monks Wood Experimental Station Report for 1972-73*, Natural Environment Research Council, Huntingdon.

- JEFFERIES, D. J., MORRIS, P. A. & MULLENEUX, J. E. 1989. An enquiry into the changing status of the Water Vole *Arvicola terrestris* in Britain. *Mammal Rev.* 19: 111-131.
- JEFFERIES, D. J., STAINSBY, B. & FRENCH, M. C. 1973. The ecology of small mammals in arable fields drilled with winter wheat and the increase in their dieldrin and mercury residues. *J. Zool., Lond.* 171: 513-539.
- KIRK, J. C. & WAGSTAFFE, R. 1943. A contribution to the study of the Scottish wildcat (*Felis silvestris grampia* Miller). Part I: Size and weight. *Northw. Nat.* 18: 271-275.
- KOLB, H. H. 1977. Wildcat *Felis silvestris*, pp.375-382. In Corbet G. B. and Southern, H. N., (ed.) *The handbook of British Mammals*, Blackwell, Oxford.
- LATIMER, H. B. 1936. Weights and linear measurements of the adult cat. *Am. J. Anat.* 58: 329-347.
- LATIMER, H. B. 1937. The weights and linear measurements of the digestive system of the adult cat. *Anat. Rec.* 68:469-480.
- LOCKIE, J. D., RATCLIFFE, D. A. & BALHARRY, R. 1969. Breeding success and organochlorine residues in golden eagles in west Scotland. *J. appl. Ecol.* 6: 381-389.
- MEYER-HOLZAPFEL, M. 1968. Breeding the European wildcat *Felis s. silvestris* at Berne Zoo. *International Zoo Yearbook* 8: 31-38.
- MILLAIS, J. G. 1904-06. *Mammals of Great Britain and Ireland*. Longmans Green, London.
- SCHAUENBERG, P. 1977. Longueur de l'intestin du chat forestier *Felis silvestris* Schreber *Mammalia* 41: 357-359.
- SLOAN, J. 1961. *Advances in small animal practice*, 2, Pergamon Press, Oxford.
- TABOR, R. 1983. *The wild life of the domestic cat*. Arrow Books, London.
- TETLEY, H. 1941. On the Scottish Wild Cat. *Proc. zool. Soc. Lond.* 111(B): 13-23.
- WEST, G. P. 1988. *Black's Veterinary Dictionary*. (Edn.16) A&C. Black, London.

Publication Received

Flowers of the Mediterranean

OLEG POLUNIN & ANTHONY HUXLEY

Chatto & Windus, London, 1990. 260 pages, 311 colour photographs, numerous line drawings. Softback, ISBN 0 7011 3695 2, £12.99.

This third edition, received too late for review, updates the nomenclature used in previous editions according to alterations recommended in *Flora Europaea* and other relevant recent authorities, adds newer works to the bibliography and makes some very small textual changes. A full review will be published in *Glasg. Nat.* 22, part 2.

A Survey of Water Beetles in the Western Highlands and on Mull

**G. N. FOSTER¹, M. G. SPIRIT² and
D. COUNSELL³**

3 Eglinton Terrace, Ayr KA7 1JJ¹; 3 Rhubara View,
Mallaig, Inverness-shire PH40 4PB²; Nature
Conservancy Council, 2 Beresford Terrace, Ayr KA7
2EG³

In 1989 wetland habitats were surveyed for beetles on Mull (part of the Mid Ebudes, V.C. 103) and on the mainland in the Lochaber District (in West Inverness-shire, V.C. 97), in the west of East Inverness-shire (V.C. 98), Glenshiel in Wester Ross (V.C. 105) and the north of Argyll (V.C. 96), areas that had previously been poorly covered in the national recording scheme. The site lists were subjected to multivariate analysis (*TWINSPAN* – Hill, 1979) to classify community types. Site descriptions, in most cases with estimates of water pH, were used to characterise the habitats associated with each community.

Seventy-seven taxa were identified by GNF as adults of which seven dytiscid species were also identified as larvae by Mr R. Carr.

New Records

New records for the Inner Hebrides are easily identified by reference to Welch (1983) but it is more difficult to be certain that mainland records are new. Some of the new records have come about because of separation of species complexes. In Table 1 there are several species additional to the mainland vice-county lists of Balfour-Browne (1960). It is preferable to use Balfour-Browne's work as a data-base rather than attempt to identify all published records since then. Many such records occur in reports which, though in the public domain, are not easily accessible, and some are based on symbols of 10 km records on maps issued in the provisional atlas series.

Of the "new" mainland records the most notable are for several gyrids and for *Ochthebius viridis* in West Inverness-shire. The *Ochthebius* has previously been recorded in Scotland from South Uist (V.C. 110), Colonsay and Islay (V.C. 102), and Argyll (Foster & Eyre, 1988).

The newly recorded species for Mull are *Gyrinus distinctus* (*G. colymbus* Brit. auct.), *Anacaena lutescens*, a species recently separated from *A. limbata* (van Berge Henegouwen, 1987), *Enochrus fuscipennis*, recognised as a distinct species by Hansen (1987) and often recorded previously as a variety of *quadripunctatus*, and *Hydraena britteni*. *G. distinctus* has also been recorded recently in Scotland from Loch Kindar, Kirkcudbrightshire (V.C. 73), Loch Ederline, Argyll (Morrison, 1986) and Islay (Foster & Eyre, 1988); an additional record is by GNF for Loch Barnluasgan, Kintyre (V.C. 101, NR 793914) on 4 July 1987. Its distribution in Scotland and its relative commonness in Ireland indicate that it is characteristic of "Atlantic" lakes.

Communities

Lists were available for 108 sites. *TWINSpan* was undertaken for lists based on 1 or more to 5 or more species. When lists of less than five species were included the hierarchy was uninterpretable. For example, an analysis of lists of four or more species segregated a sample from Loch Morar from other lochs because of the presence of one species normally associated with bog pools. Also, some bog pool lists were mixed with merseland and lowland ditches. Greater "fidelity" to orthodox habitat types was achieved when *TWINSpan* was confined to the 68 lists of five or more species. It was then possible to recognise community types associated with the following ten habitats:—

- 1 upland valley mire
- 2 muddy pools and ditches, mainly on the coast and in merseland, pH range 6.0–7.8
- 3 bog pools, rock basin mires and other *Sphagnum* edges of lochs, pH range 4.5–6.7
- 4 lochs with peat substratum and rich vegetation in parts, pH range 6.3–7.2
- 5 similar to end-group 4 but more exposed and with less vegetation, pH range 4.9–7.4
- 6 Loch Poit na h – I and Loch Uisg on Mull, lowland lochs with thin reedbeds over sand and mud, pH 7.0–7.4
- 7 loch and river backwater edges with silt, sand and pebbles, usually with *Carex rostrata* and other emergent vegetation, also floating vegetation such as *Potamogeton natans*, pH range 6.2–7.5
- 8 mud and silt in stagnant water with emergent vegetation such as *Eleocharis* and *Juncus* spp., either man-made ponds beside the Caledonian Canal or lochs receiving enrichment from human habitation, pH range 5.6–7.8

9 rivers and streams with permanent water, usually little vegetation other than *Fontinalis*, pH range 6.6–8.0.

10 shallow running water such as riverbed pools and springs, pH range 7.0–8.1.

Fifty-nine observations on pH were available for types 2–10. A non-parametric test (the Kruskal-Wallis one-way analysis by ranks – Elliot, 1971) indicated that there were significant differences in acidity between the types ($P = 0.05$, χ^2 19.8 with 8 degrees of freedom), with Type 2 having the lowest pH.

New site lists can usually be classified into these end-groups by reference to the species frequency table (Table 2).

Notable Sites

The following notes are more concerned with the rarer species found at certain sites than with the common species associated with each type of community.

Type 1

NM 417482 by Beinn na Cille, V.C. 103, altitude 210 metres, 31 May.

This was the only valley mire surveyed as such habitats were largely dry in 1989.

It supported few species, *Agabus paludosus*, *Helophorus aequalis*, *Anacaena globulus*, *Enochrus fuscipennis* and *Limnebius truncatellus*, all of which occurred in several other community types.

Type 2

NM 544286, An Leth-onn, V.C. 103, pH ranging from 6.9 to 7.8 and conductivities 200–600 $\mu\text{S}/\text{cm.}$, 28 May.

These were gullies running into the sea and examples of western merseland pools with a severely impoverished fauna that rarely includes *Ochthebius* species.

The commonest species were *Hydroporus pubescens*, *H. tessellatus* and *Dryops luridus*. A striking feature of many merse pools is the occurrence of *Hydroporus incognitus*, a species that also occurs in upland pools of the area.

NM 646699, Kentra, V.C. 97, 20 May.

Saltmarsh pools with *Hydroporus nigrita*, *H. tessellatus* and *Ochthebius viridis* abundant.

NM 725314, Loch a Ghleannain, V.C. 103, pH 6.6, altitude 40 metres, 30 May.

A muddy ditch with no permanent water vegetation above the main loch.

This supported dark females of *Anacaena lutescens*, a species that may be parthenogenetic in the north of its range (van Berge Henegouwen, 1987) and was the only site in which *Hydraena britteni* was found.

Type 3

NM 299228, Fionnphort, V.C. 103, pH 5.6, altitude 10 metres, 2 June.

A small rock basin mire with *Sphagnum*, sheep's fescue (*Festuca ovina*) and floc-grass (*Glyceria fluitans*).

Eleven species of water beetle were found, none nationally rare, but the interest lies in the combination of larger dytiscids, *Ilybius aenescens*, *Rhantus suturellus*, *Colymbetes fuscus* (a rare species in the Highlands and Islands) and *Dytiscus semisulcatus*.

NM 959623, Beinn Leamhain, V.C. 97, pH 4.5, altitude 495 metres, 1 August.

A lochan with a silt and stone substratum, a margin of *Sphagnum*, and floating bur-reed (*Sparganium angustifolium*).

This was the only site for *Gyrinus opacus*. Other upland species included *Hydroporus morio* and *Agabus arcticus*.

Type 4

NH 204061, Caochan Riabhach, V.C. 96, pH 6.3, altitude 420 metres, 8 August.

A loch with substrata ranging from peat to silt to boulders, with bulbous rush (*Juncus bulbosus*), beaked sedge (*Carex rostrata*) and water lobelia (*Lobelia dortmanna*).

This was the only site for *Dytiscus lapponicus*, of which one teneral adult male was caught. The loch also supported *Potamonectes griseostriatus*.

NM 676946, Lochan Doilead, V.C. 97, pH 6.8, altitude 40 metres, 12 August.

A peaty loch with large beds of vegetation, reeds (*Phragmites australis*), beaked sedge, bog-bean (*Menyanthes trifoliata*), white water lily (*Nymphaea alba*), water lobelia etc.

Although this loch is unlike Loch nan Eala (Type 7) it also has *Graptodytes pictus*, a species that appears to be locally common between Mallaig and Arisaig. It also has *Hydroporus memnonius*, with shining females characteristic of most of Scotland, a species not found elsewhere in the survey.

Type 5

Exposed lochs of this type characteristically have few species. All three had both *Gyrinus minutus* and *G. substriatus*. A lochan near Beinn na Cille (V.C. 103, NM 415485, pH 4.3, altitude 240 metres, visited 31 May) and Lochan an Aodainn on Ardnamurchan (V.C. 97, NM 458660, pH 7.3, altitude 40 metres, visited 15 July) had *Acilius sulcatus*.

Type 6

NM 31-23-, Loch Poit na h-I, V.C. 103, pH 7.4, altitude 15 metres, surveyed at two points on 29 May and 1 June.

A large sandy loch with a rich flora including beds of reeds and bulrushes (*Schoenoplectus lacustris*).

This loch had *Haliphys confinis*, *H. fulvus*, *H. lineolatus*, *Hygrotus inaequalis*, *Hydroporus pubescens*, *Potamonectes assimilis*, *Gyrinus distinctus*, *G. substriatus*, *Helophorus flavipes*, *Laccobius bipunctatus*, *L. minutus* and *Donacia clavipes*. *G. distinctus* was abundant in all of the beds of emergent vegetation around the loch.

Type 7

NM 667860, Loch nan Eala, Arisaig, V.C. 97, pH 7.5, altitude 15 metres, 16 June.

A loch with silt and stones and beds of beaked sedge.

This was notable only for the occurrence of *Graptodytes pictus*, a species also found in Lochan Doilead (Type 4).

NM 902805, Loch Shiel, V.C. 97, pH 6.5, altitude 10 metres, 29 July.

A large loch with boulders over sand and stones on the margin with the moss

Fontinalis and shore-weed (*Littorella uniflora*).

One of the few sites with a combination of *Platambus maculatus* and *Orectochilus villosus*, species which are normally riverine but which in the Western Highlands can also occur on wave-washed shores with boulders or other cover.

Type 8

NH 341039, Caledonian Canal, V.C. 96, altitude 30 metres, 10 August.

A small pool beside the canal with substratum of silt and stones, with soft rush (*Juncus effusus*).

The only site for *Gyrinus aeratus*.

NM 434513, Loch na Cuilce, V.C. 103, pH 7.0, just above sea level, 31 May.

A muddy lake with some brackish influence (conductivity c. 800 μ S/cm).

The only site for *Helophorus obscurus*.

NM 019790, Fass Fern, V.C. 97, pH 6.8, altitude 25 metres, 29 July.

An artificial pond over silt and stones with a floating carpet of *Sphagnum*, bog pondweed (*Potamogeton polygonifolius*) and some emergents.

The only site for *Paracymus scutellaris*.

NN 019791 Fass Fern, V.C. 97, pH 5.7, altitude 25 metres, 29 July.

Another pond, dominated by horsetail (*Equisetum fluviatile*) and rushes (*Juncus articulatus* and *J. effusus*).

Another site for female *Anacaena lutescens*.

NM 301983, Loch Oich, V.C. 97, pH 6.3, altitude 80 metres, 10 August.

A reedbed in a large loch, a list from another part of the loch being classified as Type 7.

The only site for *Gyrinus caspius*, which was much more common than *G. substriatus*, and *Helophorus strigifrons*.

Type 9

NG 854202, River Glen More, V.C. 97, pH 7.1, altitude 50 metres, 25 July.

A river with boulders and stones and some *Fontinalis*.

This was the only site found with *Deronectes latus*, present as adults and larvae.

NN 047585, South Ballachulish, V.C. 98, pH 7.0, altitude 70 metres, 19 July.

A river with boulders, stones and sand and some mosses.

The only site for *Hydroporus longulus* in the survey.

Type 10

It is normal for elmids to be placed at one extreme of any multivariate analysis matrix. In this case the presence of *Elmis aenea* brings together a spring and associated stream on Mull with riverbed pools in the Rivers Shiel and Spean, the latter both with *Oreodytes davisi*. None of the sites could be considered special.

Table 1. Species of water beetle recorded in 1989 listed according to frequency and vice-county distribution. Species are marked if additional to the mainland lists of Balfour-Browne (1960) (+) or to Welch's list for Mull (1983) (*).

	No. of occurrences	East Inverness	West	Argyll	Mull	Wester Ross
HALIPLIDAE						
<i>Haliphus confinis</i> Steph.	4	96		98	103	
<i>H. fulvus</i> (F.)	10	96	97	98	103	105
<i>H. lineatocollis</i> (Marsh.)	13	96	97	98	103	
<i>H. lineolatus</i> Mann.	2		97+		103	
<i>H. ruficollis</i> (DeGeer)	19	96	97+		103	105+
<i>H. wehncke</i> Gerh.	5	96	97+			105+
DYTISCIDAE						
<i>Hygrotus inaequalis</i> (F.)	4		97		103	
<i>Hydroporus discretus</i> Fair.	3				103	
<i>H. erythrocephalus</i> (L.)	7	96	97			
<i>H. gyllenhalii</i> Schiödt	8	96	97		103	
<i>H. incognitus</i> Sharp	7		97+		103	
<i>H. longulus</i> Muls.	1			98+		
<i>H. memnonius</i> Nic.	1		97			
<i>H. morio</i> Aubé	4	96	97		103	
<i>H. nigrita</i> (F.)	5	96	97		103	
<i>H. obscurus</i> Sturm	16	96	97		103	105
<i>H. palustris</i> (L.)	28	96	97	98	103	105
<i>H. pubescens</i> (Gyll.)	37	96	97		103	
<i>H. tessellatus</i> Drap.	9		97+		103	
<i>H. tristis</i> (Payk.)	6	96	97			
<i>Graptodytes pictus</i> (F.)	2		97			
<i>Deronectes latus</i> (Steph.)	1		97+			
<i>Potamonectes assimilis</i> (Payk.)	9	96	97		103	
<i>P. depressus depressus</i> (F.)	2		97+	98		
<i>P. depressus elegans</i> (Pz.)	8	96	97+			105
<i>P. griseostriatus</i> (DeGeer)	2	96	97+			
<i>Stictotarsus duodecimpustulatus</i>	11	96	97	98		105+
<i>Oreodytes davisi</i> Curtis	4		97+			105
<i>O. sanmarki</i> (Sahl.)	12		97+	98+	103	105+
<i>O. septentrionalis</i> (Sahl.)	5			97+		105+
<i>Platambus maculatus</i> (L.)	10	96	97+	98		105
<i>Agabus arcticus</i> (Payk.)	7	96	97		103	
<i>A. bipustulatus</i> (L.)	38	96	97		103	105
<i>A. congener</i> (Thunb.)	7	96	97			
<i>A. guttatus</i> (Payk.)	3		97		103	105
<i>A. paludosus</i> (F.)	4				103	
<i>A. sturmii</i> (Gyll.)	9	96	97		103	105
<i>Ilybius aenescens</i> Thoms.	4		97		103	
<i>I. fuliginosus</i> (F.)	22	96	97	98	103	105
<i>Rhantus suturellus</i> (Harris)	10	96	97		103	
<i>Colymbetes fuscus</i> (L.)	2	96			103	
<i>Acilius sulcatus</i> (L.)	3		97		103	
<i>Dytiscus lapponicus</i> Gyll.	1	96				
<i>D. marginalis</i> L.	2		97+			105+
<i>D. semisulcatus</i> Müll.	4		97+		103	

Table 1 continued

	No. of occurrences	East Inverness	West	Argyll	Mull	Wester Ross
GYRINIDAE						
<i>Gyrinus aeratus</i> Steph.	1	96				
<i>G. caspius</i> Men.	1		97+			
<i>G. distinctus</i> Aubé	2				103*	
<i>G. minutus</i> F.	4				103	
<i>G. opacus</i> Sahl.	1		97+			
<i>G. substriatus</i> Steph.	38	96	97	98	103	105
<i>Orectochilus villosus</i> (Müll.)	2		97+			
HYDROPHILIDAE						
<i>Helophorus aequalis</i> Thoms.	2			98+	103	
<i>H. brevipalpis</i> Bed.	14		97+	98	103	105
<i>H. flavipes</i> (F.)	38	96	97	98	103	105
<i>H. grandis</i> Ill.	1		97+			105+
<i>H. obscurus</i> Muls.	1				103	
<i>H. strigifrons</i> Thoms.	1		97+			
<i>Paracymus scutellaris</i> (Ros.)	1		97			
<i>Hydrobius fuscipes</i> (L.)	4	96	97+		103	
<i>Anacaena globulus</i> (Payk.)	27	96	97	98	103	105
<i>A. lutescens</i> (Steph.)	2		97+		103*	
<i>Laccobius bipunctatus</i> (F.)	11	96	97		103	105+
<i>L. minutus</i> (L.)	9	96	97+	98	103	
<i>Enochrus affinis</i> (Thunb.)	1				103	
<i>E. fuscipennis</i> (Thoms.)	12	96	97		103	
HYDRAENIDAE						
<i>Ochthebius viridis</i> Pey.	1		97+			
<i>Hydraena britteni</i> Joy	1				103*	
<i>H. gracilis</i> Germ.	2		97+		103	
<i>Limnebius truncatellus</i> (Thunb.)	16	96	97		103	105
DRYOPIDAE						
<i>Dryops luridus</i> (Er.)	8		97	98	103	
ELMIDAE						
<i>Elmis aenea</i> (Müll.)	3		97		103	105
<i>Limnius volckmari</i> (Pz.)	4		97			105
<i>Oulimnius tuberculatus</i> (Müll.)	5	96	97	98		
CHRYSOMELIDAE						
<i>Donacia clavipes</i> F.	1				103	
<i>D. versicolore</i> (Brahm)	1		97			
<i>Plateumaris discolor</i> (Pz.)	1				103	
No. lists		11	60	6	24	7
No. species		36	62	18	49	25

Table 2. Species percentage frequency table of water beetles based on occurrences of forty per cent or more in lists of five or more species.

END-GROUP	1	2	3	4	5	6	7	8	9	10
No. sites	1	9	13	5	3	3	11	13	7	3
<i>Gyrinus minutus</i>	—	—	—	—	100	—	—	—	—	—
<i>Agabus arcticus</i>	—	—	—	—	67	—	—	—	—	—
<i>Acilius sulcatus</i>	—	—	—	—	67	—	—	—	—	—
<i>Rhantus suturellus</i>	—	—	46	40	—	—	—	—	—	—
<i>Hydroporus gyllenhalii</i>	—	—	—	40	—	—	—	—	—	—
<i>Enochrus fuscipennis</i>	+	—	85	—	—	—	—	—	—	—
<i>Agabus congener</i>	—	—	46	—	—	—	—	—	—	—
<i>Hydroporus obscurus</i>	—	—	54	40	—	—	—	—	—	—
<i>H. pubescens</i>	—	78	69	100	—	67	—	—	—	—
<i>Agabus bipustulatus</i>	—	56	92	100	—	—	—	—	—	—
<i>Hydroporus incognitus</i>	—	44	—	40	—	—	—	—	—	—
<i>H. tessellatus</i>	—	67	—	—	—	—	—	—	—	—
<i>Laccobius bipunctatus</i>	—	78	—	—	—	—	—	—	—	—
<i>Anacaena globulus</i>	+	44	46	40	—	—	—	—	—	67
<i>Potamonectes assimilis</i>	—	—	—	—	67	100	—	—	—	—
<i>Gyrinus substriatus</i>	—	—	—	80	100	67	—	77	—	—
<i>Helophorus flavipes</i>	—	67	—	—	—	—	—	69	43	—
<i>Ilybius fuliginosus</i>	—	—	—	80	—	—	82	—	—	—
<i>Hydroporus palustris</i>	—	—	—	80	—	—	64	77	—	—
<i>Halplus lineatocollis</i>	—	—	—	—	—	—	—	46	—	—
<i>H. ruficollis</i>	—	—	—	—	—	—	—	77	—	—
<i>Stictotarsus 12-pustulatus</i>	—	—	—	—	—	—	54	—	—	—
<i>Potamonectes elegans</i>	—	—	—	—	—	—	54	—	—	—
<i>Platambus maculatus</i>	—	—	—	—	—	—	54	—	—	—
<i>Laccobius minutus</i>	—	—	—	—	—	100	—	—	—	—
<i>Halplus lineolatus</i>	—	—	—	—	—	67	—	—	—	—
<i>H. fulvus</i>	—	—	—	—	—	100	—	—	—	—
<i>Gyrinus distinctus</i>	—	—	—	—	—	67	—	—	—	—
<i>Limnebius truncatellus</i>	+	—	—	—	—	—	45	—	—	67
<i>Oreodytes sanmarki</i>	—	—	—	—	—	—	—	—	100	67
<i>O. davisi</i>	—	—	—	—	—	—	—	—	—	67
<i>Limnius volckmari</i>	—	—	—	—	—	—	—	—	43	—
<i>Elmis aenea</i>	—	—	—	—	—	—	—	—	—	100

N.B. “+” indicates presence at the sole site for type 1.

Acknowledgments

The Council and Publishing Committee of the *Glasgow Natural History Society* wish to express their gratitude to those members of the Society whose anonymous donations have greatly helped in the production of this issue of *The Glasgow Naturalist*.

Acknowledgments

We are grateful to the British Ecological Society for the award of Small Ecological Projects Grant No. 712 and to Messrs Andrew Bachell and Angus Laing, of the Nature Conservancy Council, for supplying site information. Mr Bachell also arranged additional financial support from the Nature Conservancy Council. Angus Spirit helped with the survey work.

References

- BALFOUR-BROWNE, F., 1960. The aquatic Coleoptera of Scotland and their routes of arrival. *Entomologist's Gaz.* 11: 69-106.
- van BERGE HENEGOUWEN, A., 1986, Revision of the European species of *Anacaena* Thomson (Coleoptera: Hydrophilidae). *Entomologica scandinavica* 17: 393-407.
- ELLIOT, J. M., 1971. Some Methods for the Statistical Analysis of Samples of Benthic Invertebrates. *Scient. Publs Freshwat. Biol. Ass. No.* 25.
- FOSTER, G. N. & EYRE, M. D., 1988. The water beetles of Islay. *Glasg. Nat.* 21: 423-431.
- HANSEN, M., 1987. The Hydrophiloidea (Coleoptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* 18 pp. 254.
- HILL, M. O., 1979. *TWINSPAN — a FORTRAN program for arranging multivariate data in an ordered two-way table by classification of the individuals and attributes*. Ecology & Systematics, Cornell University, Ithaca, New York.
- MORRISON, B. R. S., 1986. New records of *Gyrinus distinctus* Aubé and *G. bicolor* F. (Col., Gyrinidae) in Scotland. *Entomologist's Mon. Mag.* 122: 200.
- WELCH, R. C., 1983. Coleoptera in the Inner Hebrides. *Proc. R. Soc. Edinb.* 83B: 505-529.

Advertisement

Lee, J. R. 1933, *The Flora of the Clyde Area*.

Professionally bound copies of the original printing of this Flora can now be provided to order, price £7.50 to members of the *Glasgow Natural History Society* and to the book trade, £10.00 to others (p. & p. 50p extra). This is still the only work of its type on the area and is in diminishing supply.

Obtainable from *The Librarian* at the address given on the inside of the back cover.

Book Reviews

A Guide to Spiders of Britain and Northern Europe

DICK JONES

Hamlyn, London, 1989, 320pp., many colour and a few monochrome photographs, line drawings. Hardback, ISBN 0 600 56710 9, £10.95.

This pocket-book is revised from the 1983 *Country Life Guide to Spiders of Britain and Northern Europe*. Starting with a description of European arachnids, details of the external anatomy and the biology of spiders are followed by hints on field-work and photography. A useful illustrated guide to spider families precedes the main section in which 300+ species of British non-lynyphiid spiders (c. 85% of the total — only rarities are excluded) and 65 non-British species are briefly described with notes on their distribution and habitats. The diminutive Linyphiidae are deliberately underplayed but 47 easily recognisable British and one foreign species are included. Finally 24 British and 1 non-British species of harvestmen are considered. Biological details are included at appropriate points.

The book boasts over 370, mostly excellent, colour and 8 monochrome photographs. The author claims to include all species which can be identified by their shape and markings and many, but not all, can be recognised from his photographs. This volume is unique for its price and format and will doubtless stimulate an interest in these somewhat neglected animals which can be consolidated by reference to professional texts. Unfortunately nomenclature largely follows an outdated check-list and M. J. Roberts' 1985-87 monograph *Spiders of Great Britain and Ireland* receives no mention.

RONALD M. DOBSON

Creating a Wildlife Garden

BOB AND LIZ GIBBONS

Hamlyn 1988, 156pp, numerous diagrams and colour illustrations. ISBN 0 600 56941 1, £7.99.

The sub-title "How to turn your garden into a wildlife haven", is described in detail in this well-illustrated and attractive book. The authors are clearly experienced and practical gardeners, and have visited many examples of Wildlife Gardens in England and on the Continent. Because they do not use only native plants, many of the gardens illustrated do not look unusual; it is the methods of cultivation and plant care that allow the plants and animals to co-exist. The lists of plants which can be used to create different mini-habitats, are an important part of the book, and could be very helpful in starting a garden for Wildlife. Although it does not add a great deal to the wealth of literature recently produced on the same subject, if some gardeners are encouraged to change their gardens in the ways suggested, the authors will have succeeded in their aims.

JEAN M. MILLAR

The Natural History of the Muck Islands, North Ebrudes

7. Insecta:

Apterygota and Exopterygota

RONALD M. DOBSON

Department of Zoology, University of Glasgow,
Glasgow G12 8QQ.

This paper lists all the identified apterygote and exopterygote insects, except for Collembola and Aphidoidea which both merit special treatment, collected from the Muck Islands by the author between 1977 and 1988.

Some 33 visits, varying in duration from one to 20 days, were made to the island group and collections were made during every month of the year except October. All parts of Muck and Lamb Island, apart from private gardens, were visited repeatedly. The tidal Horse Island was visited whenever possible and the isolated rock Eagamol, which is accessible only by boat, was visited three times. The islands are divided among four 10km squares of the National Grid, NM 37, 38, 47 and 48, but by far the greatest area and the greatest diversity of habitat occurs in square 47. Consequently this square was worked more extensively and was recorded more completely than the others.

Methods of collecting included sweep-netting and beating of foliage; examination of foliage, plant stems etc.; extraction of moss, lichen and litter samples by Tullgren funnel; year-round pit-fall trapping; netting of lochans, pools and burns and the operation of an ultra-violet light trap.

Species are listed with details of their habitats, distribution and abundance. Also, to facilitate comparisons their occurrence in other islands within the Small Isles and Outer Hebrides as derived from the following sources is indicated. Canna — Bertram, 1939; Eigg — Kevan, 1940; Rum — Wormell, 1982; Outer Hebrides — Waterston, 1981; Hebrides — Walton, 1942.

Names of insect orders follow Davies (1988) while specific names are as in Kloet and Hincks (1964) except for the following: Psocoptera — New, 1974; aquatic Hemiptera (Heteroptera) — Savage, 1989; Hemiptera (Homoptera) — Le Quesne and Payne, 1981; Odonata — McGeeney, 1986. Place names are as in Dobson and Dobson (1985) and Dobson (1987). M = Muck; L = Lamb Island; H = Horse Island; Ea = Eagamol; C = Canna; E = Eigg; R = Rum; OH = Outer Hebrides, V.C. 110; 37, 38, 47, 48 = 10km National Grid square (NM). The author takes sole responsibility for the accuracy of identifications which were based on the literature and, where possible, comparison of material in the Insect Collection of the Hunterian Museum, Glasgow University. Species marked * were verified by examination of genitalia or other parts which provide specifically distinct characters. Records found in the literature but not confirmed in the present survey are enclosed in bold brackets. Voucher specimens are retained in the author's collection which will be lodged in the Zoology Department at Glasgow University.

List of Species

ARCHAEOGNATHA

MACHILIDAE

**Petrobius brevistylis* Carpenter; M: one male found in East Muck during May 1986 was positively identified. However females and immatures found at many sites both on the shore and inland could well be of this species. (OH).

ODONATA

COENAGRIIDAE

Pyrhosoma nymphula (Sulzer); M; 47,48; fairly common; (C,E,R,OH).
Ischnura elegans (van den Linden); M; 47,48; common; (C,E,R,OH).
Enallagma cyathigerum (Charpentier); M; 47; common round Central Lochan E.; (E,R,OH).

LESTIDAE

Lestes sponsa (Hansemann); M; 47,48; common; (E,R,OH).

LIBELLULIDAE

Libellula quadrimaculata L.; M; 48; few at Am Maol Lochan; (C,E,R,OH).
Sympetrum nigrescens Lucas. M; widespread; (C,E,OH).
Sympetrum danae (Sulzer); M; 48; one at Bagh; (E,R,OH).

PLECOPTERA

NEMOURIDAE

Leuctra fusca (L.); M; 48; locally abundant; (R,OH).

PERLODIDAE

?*Isoperla grammatica* (Poda); M; one nymph found in Gleann Mhartein was believed to be of this species; (R,OH).

ORTHOPTERA

ACRIDIDAE

Omocestus viridulus (L.); M; 37,47; common and widespread; (C,E,R,OH).

DERMAPTERA

FORFICULIDAE

Forficula auricularia L.; M,H; 37,38,47,48; abundant and widely distributed; (C,E,R,OH).

PSOCOPTERA

CAECILIIDAE

Caecilius flavidus (Stephens); M; 47; on trees, Central Wood; (C,R,).

**Caecilius burmeisteri* Brauer; M; 47; on trees, Central Wood.

ELIPSOCIDAE

Elipsocus hyalinus (Stephens); M; 47; on trees, Central Wood; (R,OH).

Elipsocus westwoodi McLachlan; M; 47; numerous on trees, Central Wood; (C,R,OH).

PSOCIDAE

**Amphigerontia bifasciata* (Latreille in Coquebert); M; 47; on trees, Central Wood; at light Port Mor Wood; (C,R).

STENOPSOCIDAE

Graphopsocus cruciatus (L.); M; 48; one on *Angelica* in wood; (C,R).

**Stenopsocus immaculatus* (Stephens); M; 47; on trees, Central Wood; (R).

PHTHIRAPTERA

MENOPODIDAE

Myrsidea cornicis (DeGeer); M; 48; several found on dead Hooded Crow (*Corvus corone cornix* L.) at Port Mor.

HEMIPTERA (HETEROPTERA)

LYGAEIDAE

Stygnocoris pedestris (Fall.); M,H; 37,38,47,48; common & widespread; (C,R,OH).

Scolopostethus decoratus (Hahn); M; 37; Gleann Mhartein, uncommon; (R,OH).

TINGIDAE

Acalypta parvula (Fallen); M; 37,47 (near Bothy Stone); uncommon; (R,OH).

Tingis cardui (L.); M; 47; one on *Cirsium vulgare* at Port Mor; (C,R,OH).

NABIDAE

Nabis flavomarginatus Scholtz; M; 47,48; locally common; (C,R,OH).

CIMICIDAE

Anthocoris confusus Reuter; M; 48; uncommon; (R).

Anthocoris nemoralis (F.); M; 47; common in Central and Port Mor Woods; (R).

Anthocoris nemorum (L.); M; 47,48; common in and near wooded areas; (C,?E,R,OH).

MIRIDAE

Bryocoris pteridis (Fallen); M; 48; one near Am Maol; (E).

Plagiognathus arbustorum (F.); M; 47; uncommon; (E).

Plagiognathus chrysanthemi (Wolff. J.F.); M; 47; abundant in hayfield; (C,E,R,OH).

Cytorhinus caricis (Fallen); M; few; (R,OH).

Mecomma ambulans (Fallen); M; 47; in Gallanach area; (C,E,R,OH).

Mecomma dispar (Bohemann); M; 47; one near Central Lochan E.; (R).

Pithanus maerkeli (Herrich-Schaeffer); M; 47,48; several, in swampy places; (C,R,E,OH).

Lygus rugulipennis Poppius; M; 47; uncommon; (?C,?E,R,OH).

Orthops campestris (L.); M; 47; occasional, in woods; (R,OH).

Lygocoris pabulinus (L.); M; 47; on Rowan, Central Wood; (C,R,OH).

Lygocoris viridis (Fallen); M; 47; common on Rowan in Central Wood; (R).

Calocoris norvegicus (Gmelin); M; 47,48; common in fields and swamps; (C,E,R,OH).

Capsus ater (L.); M; 47,48; occasional in Central Wood and Gallanach area; (C,E,R).

Stenodema calcaratum (Fallen); M; 47,48; uncommon; (R).

Trigonotylus ruficornis (Geoffroy in Fourcroy); M; 47,48; common in swampy areas; (C,R,OH).

Teratocoris saundersi Douglas & Scott; M; 47; few near Central Lochan E.; (C,R,OH).

Leptoterna ferrugata (Fallen); M; 47,48; common and widespread; (C,E,R,OH).

SALDIDAE

Saldula saltatoria (L.); M; 37; one near shore; (C,E,R,OH).

Chartoscirta cincta (Herrich-Schaeffer); M,H; 38,48; (R,OH).

VELIIDAE

Velia caprai Tamanini; M; 47; in burn near east coast (rec. Walton, 1942, M); (C,E,R,OH).

GERRIDAE

Gerris thoracicus Schummel; M; 47,48; common, Central Lochan E. & pond on Aird nan Uan; (OH).

Gerris lacustris (L.); M; 47,48; common, Central Lochan E. & Am Maol Lochan; (E,R).

NEPIDAE

Nepa cinerea L. M; 47,48; common in burns and lochans (rec. Harrison, 1941: Walton, 1942, M); (C,R,OH).

NOTONECTIDAE

Notonecta obliqua Gallen; M; 47,48; common in ponds and swamps (rec. Walton, 1942, M); (E,R,OH).

(*Notonecta obliqua* f. *delcourti* Poisson; rec. Walton, 1942, M; (OH).)

CORIXIDAE

(*Cymatia bondsdorffi* (Sahlberg, C.); rec. Walton, 1942, M; (E,R,OH).)

**Callicorixa praeusta* (Fieber); M; 48; one in Am Maol Lochan (rec. Walton, 1942, M); (E,R,OH).

Corixa punctata (Illiger); M; 47,48; common and widespread in ponds (rec. Walton, 1942, M); (E,R,OH).

Hesperocorixa linnaei (Fieber); M; 47; occasional; (E,OH).

**Hesperocorixa sahlbergi* (Fieber); M; 47,48; few in lochans and swamps; (C,E,OH).

**Hesperocorixa castanea* (Thomson); M; 47,48; common, Am Maol Lochan & Central Lochan E. (rec. Walton, 1942, M); (C,E,R,OH).

(*Sigara distincta* (Fieber); rec. Walton, 1942, M; (E,R,OH).)

Sigara scotti (Douglas & Scott); M; 47; several found, Central Lochan E. and Am Maol Lochan (rec. Walton, 1942, M); (E,R,OH).

**Sigara nigrolineata* (Fieber); H,M; 38,47; several found; (C,E,R,OH).

Sigara semistriata (Fieber); M; 47,48; widespread and common in ponds and swamps (rec. Walton, 1942, M); (OH).

**Sigara venusta* (Douglas & Scott); M; 48; common in burn at Bagh; (C,R,OH).

HEMIPTERA (HOMOPTERA)

CERCOPIDAE

Philænus spumarius (L.); H,M; 37,38,47,48; widespread and abundant; (C,E,R,OH). This polymorphic species was investigated on Muck and the other Scottish sites by A. J. Berry (1983).

Neophilaenus exclamationis (Thunberg); M; 37; uncommon; (R).

**Neophilaenus lineatus* (L.); M; 37,47,48; common; (C,E,R,OH).

CICADELLIDAE

Ulopa reticulata (F.); H,M; 38,47,48; common and widespread; (C,E,R,OH).

Megophthalmicus scanicus (Fallen); H,M; 38,47,48; common; (C,R,OH).

Cicadella viridis (L.); M; 47,48; common and widespread; (R).

Evacanthus interruptus (L.); M; 47,48; common and widespread; (C,E,R,OH).

Idiocerus confusus Flor; M; 47; On *Salix cinerea*, Central Wood; (R).

Idiocerus elegans Flor; M; 47; uncommon on *Salix aurita*.

**Oncopsis flavicollis* (L.); M; 47; two in Port Mor Wood; (E,R).

Aphrodes bicinctus (Schränk); M; 37,47,48; common and widespread; (C,R,OH).

Aphrodes albifrons (L.); M; 48; one near Am Maol; (C,R,OH).

**Jassargus distinguendus* (Flor); H,M; 38,48; few, but widespread; (C,R,OH).

Arthaldeus pascuellus (Fallen); M; 48; one at Toaluinn; (C,R).

Limotettix striola (Fallen); M; 47; common, near Central Lochan E.; (C,R,OH).

Conosanus obsoletus (Kirschbaum); M; 47,48; not common; (R).

**Cicadula aurantipes* (Edwards); M; 47,48; common.

**Cicadula persimilis* (Edwards); M; 47; common, hayfield near Gallanach.

**Cicadula quadrinotata* (F.); M; 37; uncommon in undergrowth, Gleann Mhartin; (R).

Elymana sulphurella (Zetterstedt); M; 47; one in hayfield near Gallanach; (C,R,OH).

Eupteryx notata Curt.; M; 47; uncommon on slopes of Ben Airean; (R).
Edwardsiana rosae (L.); M; 48; numerous on *Rosa* at Bagh; (R).

CIXIIDAE

Cixius nervosus (L.); M; 48; one near Am Maol; (C,R,OH).

DELPHACIDAE

Euconomelus lepidus (Boheman); M; 37; one on *Salix*, Gleann Mhartein; (C).

**Conomelus anceps* (Germar); M; 47,48; macropters and micropters moderately common near Bagh; (R,OH).

**Javesella discolor* (Boheman); Ea;M; 38,47; locally common; Eagamol and woods; (R).

**Javesella dubia* (Kirschbaum); Ea; 38; two found; (C,R,OH).

**Javesella forcipata* (Boheman); M,H; 38,48; occasional; (C,R,OH).

Tyrphodelphax distinctus (Flor); M; 47,48; moderately common and widely distributed; (OH).

PSYLLIDAE

Psylla alni (L.); M; 47; common on *Alnus* in Port Mor and Central Woods; (R,OH).

Psylla melanoneura Forster; M; 47; common, on deciduous trees in woods; (C).

Psylla moscovita Andrianova; M; 48; few by sweeping herbage in N.W. Muck; (OH).

Psylla sorbi (L.); M; 47; common on *Sorbus aucuparia* in Port Mor and Central Woods; (?C,OH).

Trioza urticae (L.); M; 48; few on *Urtica dioica*; (C,R,OH).

DIASPIDIDAE

Chionaspis salicis (L.); M; 47; common on stems of *Salix repens* (checked by C. Hodgson); (R).

ORTHEZIIDAE

Arctorthezia cataphracta (Olafsen); M,H; 38,47,48; common and widespread; (C,R,OH).

THYSANOPTERA

THRIPIDAE

Taeniothrips picipes (Zetterstedt); M; 47,48; on various low plants including *Urtica dioica* and *Primula vulgaris*, common and widely distributed; (C).

Discussion

This paper records 101 distinct species of apterygote and exopterygote insects from the Muck Islands and, although the list is clearly incomplete, the frequent appearance of the same forms in numerous collections made on different dates throughout the 12 years of the survey suggests that it may be fairly representative of

the fauna within the groups considered. Eight-nine species of insects appear to be noted here for the first time.

As might be expected, the fauna of the Muck Islands closely resembles those of its neighbouring islands and 81 of the species recorded here also occur in Rum (Wormell, 1982; Walton, 1942), 49 in Canna (Bertram, 1939) and 36 in Eigg (Kevan, 1940). These figures should not, of course, be regarded as providing any reliable index of similarity because to a large extent they reflect the varying amounts of work which have been done on these islands. The Eigg and Canna lists present the results of one and two excursions respectively whereas the Muck and Rum lists are the results of years of study. The Muck list also has much similarity to that for the Outer Hebrides (Waterston, 1981), there being 69 species in common.

Most species found were those which might be expected from the region and only five were new to it. Of these, the psocid *Caecilia burmeisteri*, recognised by its characteristic lacinia, is a common form associated with conifers in many parts of Britain including Scotland and the three cicadellids, the distinctively patterned *Idiocerus elegans* found on *Salix*, *Cicadula aurantipes*, associated with *Carex* and *C. persimilis*, occurring on *Juncus* and *Carex* are all Scottish insects. The fifth species, the bird louse *Myrsidea cornicis* is of little interest as it is a regular parasite of crows and has no particular Scottish connections.

Some unusual distributional features may be noted. The Bristle-tail *Petrobius brevistylis* occurs in Muck and individuals of this genus, not identifiable to species, abounded. The other British species, *P. maritimus* (Leach), occurs on Eigg and both species were widely distributed in the Outer Hebrides. These conspicuous insects were, however, either absent from, or so infrequent on Canna and Rum as to have escaped notice in published reports.

The fauna of Muck can be most usefully compared with that of Rum which lies 9km to the North. The number of species which can exist on an island is obviously related to the number of available niches, which in turn is related to area (A. J. Berry, 1983). Rum, with an area almost 20 times that of Muck and with both montane and lowland areas, clearly has greater habitat diversity than Muck and would be expected to show a greater diversity of species. This prediction is partly upheld.

Grassland is extensive in Muck but only one species of grasshopper was found whereas Rum has four. The terrestrial Hemiptera (excluding Aphidoidea) were also relatively poorly represented on Muck, there being 63 species in contrast to the 151 on Rum.

Muck has numerous lochans, pools, burns and swamps but only two species of stonefly were found compared to 12 on Rum and there were only seven types of dragonfly compared to Rum's 10 (Duncan, 1985). Muck apparently lacks mayflies whereas Rum has 16 species.

Regarding the aquatic Hemiptera, comparisons between the various islands were more concerned with the differences in the actual species present than with the numbers of species. Muck has two species of pond-skater, *Gerris thoracicus* and *G. lacustris*. The former does not appear to occur in any of the other "Small Isles" although it has been found on some other islands of the North Ebudes (Walton, 1942) and is widely distributed in the Outer Hebrides. The latter occurs on Eigg and, if it occurs at all on Rum, is clearly not common as it was listed by Walton (1942) but not by Wormell (1982). On the other hand two species not found on Muck, the "Highland" *G. costai poissoni* Wagner & Zimmerman seemed common or abundant on Canna, Eigg, Rum and the Outer Hebrides and *G. odontogaster* (Zetterstedt), though less conspicuous, occurred on Eigg, Rum and the Outer Hebrides but not on Canna.

The Water Scorpion, *Nepa cinerea* is quite common on Muck, but only one record was given for it in Rum. Eleven species of corixids have been recorded for Muck, although two old records were not confirmed during the present work. Rum boasts 12 species eight of which occur on Muck the remaining species all being found either in the Small Isles or Outer Hebrides.

These irregular distribution patterns can not be explained with our present knowledge. Differing soil types and land usages, vegetation, climates, drainage, altitudes, salinities, acidities and mobilities combined with selection probably all play parts in determining which species survive on each island.

The flightlessness of *Petrobius* spp. may be connected with their discontinuous distribution and the forces of selection may determine the statistical distribution of morphs of the spittlebug *Philaenus*

spumarius where populations on the low-lying islands of Muck, Canna and Eigg are similar to each other but differ from the population on the more mountainous Rum which, in turn, resembles that at Arisaig on the mainland nearby (A. J. Berry, 1983).

Savage (1989) neatly demonstrates the effects of differing conditions on the populations of the aquatic Hemiptera. Still or running waters, organic content, conductivity, pH and altitude as well as geographic location all exert influences. For example, *Gerris lacustris*, which occurs in Muck has quite different ecological requirements from *Gerris costae poissoni* found in Rum.

Detailed ecological studies involving the measurements of population numbers and all relevant variables will be needed before these distributional problems can be solved.

Acknowledgments

I am grateful to Mr and Mrs Lawrence MacEwen for permission to work on Muck and to them and the other residents of Muck for their friendship and generous hospitality. Above all I must thank my wife Ruth for her help, tolerance and constant encouragement.

References

- BERRY, A. J., 1983. Elytral polymorphism in the spittlebug *Philaenus spumarius* (L.) from the Inner Hebrides. *Biol. J. Linn. Soc.* 19: 123.
- BERRY, R. J., 1983. Evolution of animals and plants. *Proc. Roy. Soc. Edinb.* 83B: 433.
- BERTRAM, D. S., 1939. The Natural History of Canna and Sanday, Inner Hebrides: A Report upon the Glasgow University Canna Expedition, 1936 and 1937. *Proc. R. phys. Soc. Ed.* 23: 1-72.
- DAVIES, R. G., 1988. *Outlines of Entomology* (Edn. 7). London & New York.
- DOBSON, R. H. & DOBSON, R. M., 1985. The Natural History of the Muck Islands, North Ebudes 1. Introduction and Vegetation with a list of Vascular Plants. *Glasg. Nat.* 21: 13-38.
- DOBSON, R. M., 1987. The Natural History of the Muck Islands, North Ebudes 4. Beetles. *Glasg. Nat.* 21: 335-349.
- DUNCAN, P. B., 1985. The Odonata of Rhum. *Entomologists' Mon. Mag.* 121: 27.
- HARRISON, J. W. H., 1941. *Nepa cinerea* L. (Hem., Nepidae) in the Isle of Muck. *Entomologists' Mon. Mag.* 77: 240.
- KEVAN, D. K. McE., 1940. The Insect Fauna of the Isle of Eigg. *Entomologist* 73: 247-254.

- KLOET, G. S & HINCKS, W. D., 1964. A check list of British Insects (Edn.2), Pt.1: Small Orders and Hemiptera. *Handbk Ident. Br. insects* XI (1). London.
- LEQUESNE, W. J. & PAYNE, K. R., 1981. Cicadellidae (Typhlocybinae) with a check list of the British Auchenorrhyncha (Hemiptera Homoptera). *Handbk Ident. Br. insects* II (2c). London.
- McGEENEY, A., 1986. *A Complete Guide to British Dragonflies*. London.
- MOUND, L. A., MORISON, G. D., PITKIN, B. R. & PALMER, J. M., 1976. Thysanoptera. *Handbk Ident. Br. insects* I (11). London.
- NEW, T. R., 1974. Psocoptera. *Handbk Ident. Br. insects* I (7). London.
- SAVAGE, A. A., 1989. Adults of the British Aquatic Hemiptera-Heteroptera: a Key with Ecological Notes. *Scient. Publs Freshwat. Biol. Ass. No. 50*.
- WALTON, G. A., 1942. The aquatic Hemiptera of the Hebrides. *Trans. R. ent. Soc. Lond.* 92: 417-452.
- WATERSTON, A. R., 1981. Present knowledge of the non-marine fauna of the Outer Hebrides. *Proc. R. Soc. Edinb.* (B) 79: 215-321.
- WORMELL, P., 1982. The Entomology of the Isle of Rhum National Nature Reserve. *Biol. J. Linn. Soc.* 18: 291-401.

Book Review

The Hebrides

J. M. BOYD and I. L. BOYD

Collins New Naturalist Library, 1990, 416 pages, colour and monochrome photographs, line drawings, maps, graphs. Limpback, ISBN 0 00 2198 85/1, £12.95.

This is a book of erudition and in some 400 pages the authors have neatly summarised their extensive knowledge of the Natural History of both Inner and Outer Hebrides. Subjects vary from geology and soils, through selected habitats such as the sea and sea shore, farm and croft lands, swamps and machair to problems of fish farming, land use and conservation. There is a useful resume of the contributions of individual naturalists from the 16th century until the present day and there is an extensive up-to-date bibliography.

With so much learning compressed into such small space one might have expected a somewhat terse and dry exposition. This is far from the case, however, and the authors may be congratulated for producing a text which is not only clear and readable, but at times, in passages of almost poetic intensity, reveals the delight and sense of wonder they have in their subject.

Inevitably a few typographical and factual errors have survived proof reading: e.g. misquotation regarding arrival of brown rats (p.275), historical inaccuracies regarding responsibility for and date of suppression of Jacobites (p.315).

This volume will, without doubt, remain the standard text on the Natural History of the Hebrides for many years and should be updated from time to time. The undersigned bought his own copy within days of starting to read that sent for review.

RONALD M. DOBSON

Ledum on Flanders Moss

I. C. CHRISTIE

Gartlea, Caldarvan by Alexandria

There is a concentrated colony of *Ledum groenlandicum* (Fig. 1) in the National Nature Reserve section of Flanders Moss, approximately 3.8km S.E. of the Lake of Menteith, V.C. 87 (West Perth).

The genus *Ledum* occurs in the northern regions of Europe, Asia and America. Two taxa are recognised and these have been variously regarded as separate species, *L. palustre* and *L. groenlandicum*, or as subspecies of *L. palustre*, *L. palustre palustre* and *L. palustre groenlandicum*. The former occurs in Eurasia and America, the latter in Greenland and America. The taxa can be distinguished as follows:

	Ratio: Leaf length/width	No. of stamens
<i>L. palustre</i> L.	4-12 / 1	(7 -)10(- 11)
<i>L. groenlandicum</i> Oeder	2.5-5 / 1	(5 -) 8(- 14)

The plants on Flanders Moss clearly belong to the latter 'species' on both characters, the ratio leaf length/width being in the range 3.5-5/1 and stamen number varying from 5 to 8. In a study of flower heads from 41 plants, 15% had 5 stamens, 46% had 6, 29% had 7 and 10% had 8.

The origin of the colony is unknown but various possibilities were discussed by Ribbons (1976). The following factors appear relevant:

- (1) *L. groenlandicum* is easily raised from seed.
- (2) The colony occupies one small area, whereas several parts of the Moss appear equally suitable for the species.

- (3) The axis of the colony runs north/south, whereas the prevailing wind direction is west/east. Regeneration can be seen to the east of established bushes.
- (4) There is a clump of *Kalmia polifolia*, another native of Eastern North America, on the edge of the *Ledum* colony. This measures 8ft by 5ft and may well be of similar age to the older *Ledum* bushes.

This suggests that a number of *Ledum* and one (surviving) *Kalmia* were planted by an enthusiast many years ago, perhaps in the late 19th/early 20th century. They were planted in a scatter about a N/S axis. Ribbons was told that "a Dr Beattie of Callander, who travelled in Labrador, had planted shrubs in the bogs near his home". It is reasonable to suppose that the doctor brought back seed, raised a quantity of plants and transplanted them into suitable sites. This was commoner practice than some botanists acknowledge. I see little merit in ascribing their origin to wind blown seed or to seed carried on birds' feet, though these possibilities cannot be completely excluded.

A census of all bushes of at least one foot in diameter was made on 24 May, 1989. Each 100 metre square of the NNR grid was quartered into four 50m sided squares by using long bamboo canes with flags on top and the bushes in each quarter were counted by two people walking up and down in line. The diameter of each bush was estimated to the nearest foot but it was not possible to determine whether the larger bushes represented a single plant or more than one which had merged vegetatively. Plants situated among hummocks of moss and cotton grass are able to spread horizontally by layering into these and the larger bushes have arisen in this manner.

Hence the census was of 'bushes' rather than of 'plants'. 81 bushes were counted and their numbers, sizes and distribution in relation to the 50m squares were recorded (Fig. 2 and Table 1). The total area covered by these bushes works out at 2519 square feet, which is somewhat less than one-seventeenth of an acre.

Regeneration from seed is still taking place though clearly to a lesser extent than formerly and is especially evident in square E in the vicinity of the largest bush. Overall there are several dozen plants from 2 year seedlings up to one foot in diameter. Germination

succeeds best on bare peat where the vegetation is 'pawed' or 'horned' by Roe Deer.

During winter the bushes are clothed in leaves produced in the two previous seasons, with some remaining from the year before that. The leaves bear a dense brown tomentum beneath and scattered pale hairs on the upperside. Leaf fall is in October, those to be lost having assumed a reddish tint in late September. Those which remain are dark green in autumn but turn bronze-brown under the influence of frost. During April the original colour is regained, presumably in response to increasing warmth. The same changes can be observed in the leaves of Crowberry (*Empetrum nigrum*).

The flower buds burst in early May, each producing a head of 20 to 30 flowers. Flowers around the perimeter of a head open first and at this stage the head is flat. The central pedicels then lengthen and as their flowers open the head becomes convex. The pedicels and ovaries are sticky with a glandular secretion, some of which adheres to the minutely hairy sepals, and nectar is produced at the bases of the petals which, unusually for an ericaceous species, are free.

The bushes were in full flower in the last week of May 1988, by which time new growth from the terminal vegetative buds was also well developed. These shoots are mature by late June and bear flower buds for the following year. Even at this stage, the buds

Table 1 Numbers and distribution of *Ledum groenlandicum* bushes of diameter one foot or more amongst 50m sided squares in colony at Flanders Moss National Nature Reserve.

		Diameter of bushes in feet												Total
		1	2	3	4	5	6	7	8	9	10	12	24	
Square	A											1		1
	B			1										1
	C						1							1
	D			1	2	4	1	2						10
	E	2	11	4	2	4	7	2	2	7	2		1	44
	F		6	5	1	2	2		1		1	1		19
	H		1	1			1		1	1				5
Total		2	18	12	5	10	12	4	4	8	3	2	1	81

contain formed flowers, the petals and stamens in which can be counted under low magnification. Lateral vegetative buds beneath the flower heads shoot as the petals drop and these are fully developed in July.

Flowers and immature shoots are completely killed by air frost which can occur at any time up till about June 5th. The slightest freezing damages the reproductive parts of the flowers which are rendered sterile even though the petals may remain white. Ground frost can occur until late June and resultant damage varies according to the situation. Nearby Birch trees in leaf give good cover and the *Ledum* site derives considerable frost shelter from partial birch cover and is much less subject to ground frost than the open parts of the Moss in the vicinity of the High Moss Pow. The bushes were smothered in flowers in 1988 and there was very little frost damage. Despite this, most of the seed capsules were small and shrivelled and some which looked better filled revealed only a few apparently viable seeds along with many aborted ones when examined under the microscope. Seed production is thus low, even in a favourable year.

Pollination is by insects seeking nectar or pollen. The following potential pollinators were noted visiting flowers in 1988:

Hymenoptera

Bombus pascuorum (Scop.), two collecting nectar;

Bombus lucorum (Linn.), one collecting pollen;

Lepidoptera

Pieris napi (Linn.) (Green-veined White), one;

Callophrys rubi (Linn.) (Green Hairstreak), several;

Gymnoscelis rufifasciata (Haw.) (Double-striped Pug), several;

Neofaculta ericetella (Hb.), one;

Adela reaumurella (Linn.), one;

Micropterix aureatella (Scop.), one;

Diptera (Syrphidae)

Dasysyrphus venustus (Mg.), one;

Neoscia podagrica (Fabr.), one;

Platycheirus clypeatus (Mg.), one;

Coleoptera

Many small black beetles which were not identified.

Numbers of small flies (Diptera: Empididae) are attracted to the flowers and soon die, their legs securely trapped in the secretions. These, therefore, seem unlikely to act as agents of pollination.

On Flanders Moss *Ledum* leaves are not favoured as food by any particular species of insect but are occasionally eaten by species

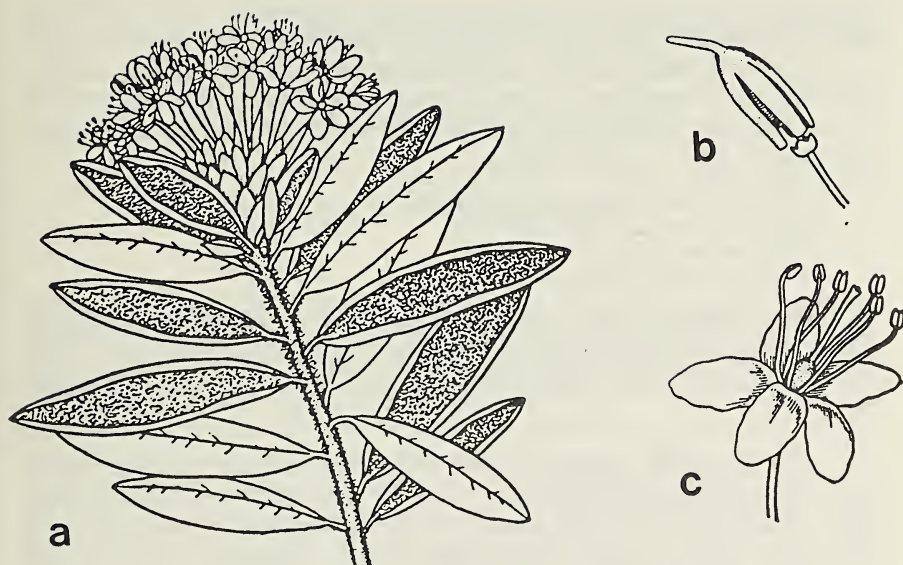
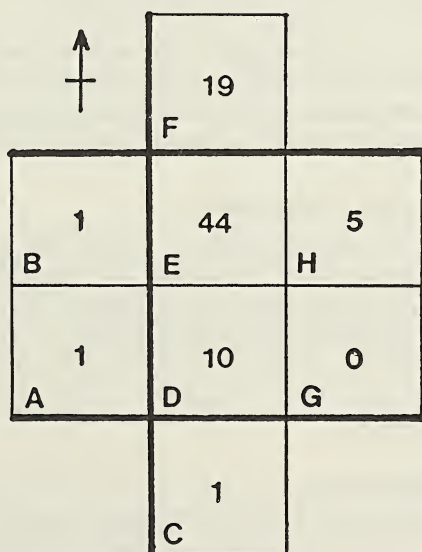


Fig. 1 *Ledum groenlandicum*. (a) Flowering head X 0.75; (b) capsule X 2.4; (c) flower X 2.4.

Fig. 2 Numbers and distribution of *L. groenlandicum* bushes of diameter 1ft. or more amongst 50m sided squares at Flanders Moss NNR. (The thicker lines represent 100m squares of the NNR grid.)



normally associated with the surrounding vegetation. Nibbled leaves were observed on bushes growing under birch trees, presumably due to temporary use by larvae of Geometridae (Lepidoptera) falling from above, though only one of these was found. Single examples of the following lepidopterous larvae were seen eating the young leaves of bushes in the open:

Trichiura crataegi (Linn.) (Pale Eggar);

Orgyia antiqua (Linn.) (Vapourer);

Acleris rufana (D. & S.);

Coleophora pyrrhulipennella Zell.

The bushes are not eaten by Roe Deer or Hares on Flanders Moss. There is some evidence that plants introduced to a new area are initially browsed by deer but that the deer soon learn to avoid them.

Several of the larger *Ledum* bushes are now past their prime and are partially dying back. The largest bush is still actively expanding due to its favourable situation among hummocks and there are many plants under one foot in diameter which have potential to mature. Establishment of new plants from seed is now very restricted within the colony and there is no indication of spread outwith it. It seems probable that the colony will persist for many years within its present limits.

In conclusion, the colony, when in full flower, is the finest spectacle that the Moss has to offer, the white *Ledum* bushes complementing the delicate green of the surrounding Birches. Dr Beattie would be proud of his handiwork!

Acknowledgments

I should like to thank Mr J. B. Pendlebury of the Nature Conservancy Council for permission to visit the site and for encouragement in preparing this paper. Figure 1 is reprinted by permission from Gleason, H. A. 1968, *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada*, vol. 3, page 9 – Copyright 1952, The New York Botanical Garden.

Reference

RIBBONS, B.W., 1976. *Ledum* in Britain. *Glasg. Nat.* 19: 219-233. (This paper discusses the distribution and recorded history of *Ledum* colonies in the British Isles. It includes many references for further reading. To the then known sites in Central Scotland should be added Dunmore Moss, south-east of Stirling.)

The Freshwater Invertebrates of the Dunbeath Estate, Caithness

M. G. SPIRIT and J. L. RYRIE

Dunbeath Preservation Trust, Old School,
Dunbeath, Caithness KW6 6EY

Dunbeath Estate in the south-east corner of Caithness is renowned for the impressive sea-cliffs which support large breeding colonies of seabirds. The native relict woodland in the sheltered strath is also important as the richest of its type in Caithness. Further inland the present climatic conditions of cool temperatures, prevailing winds dominated by westerly and south-easterly gales, and poor drainage have led to an extensive cover of blanket peat permeated by burns, rivers and lochs. Most of the underlying rock is Old Red Sandstone, in places containing lime-rich flagstones which can influence the chemistry of the water by making it less acid (Keating, 1984).

Prior to the Freshwater Invertebrate Survey of Caithness (Spirit, 1985), little was known about the fauna and flora of the Dunbeath freshwater habitats. The aims of this survey were to carry out a detailed study of the freshwater invertebrates, taking into account seasonal variation and basic water chemistry. Representative sampling sites were chosen, including dubh lochans, rivers and burns from two different watersheds of the Thurso and Dunbeath river systems.

Dunbeath Estate is as yet unaffected by the afforestation presently taking place in the county, and therefore a survey at this time may be particularly relevant as rapid changes are currently occurring over similar areas elsewhere in Caithness. These changes in land utilisation could affect the freshwater habitats in the long term.

Materials and methods

Seasonal sampling took place wherever possible to take account of variations in the populations of invertebrates (Table 1). Standard sampling methods were used to allow accurate comparisons. A two

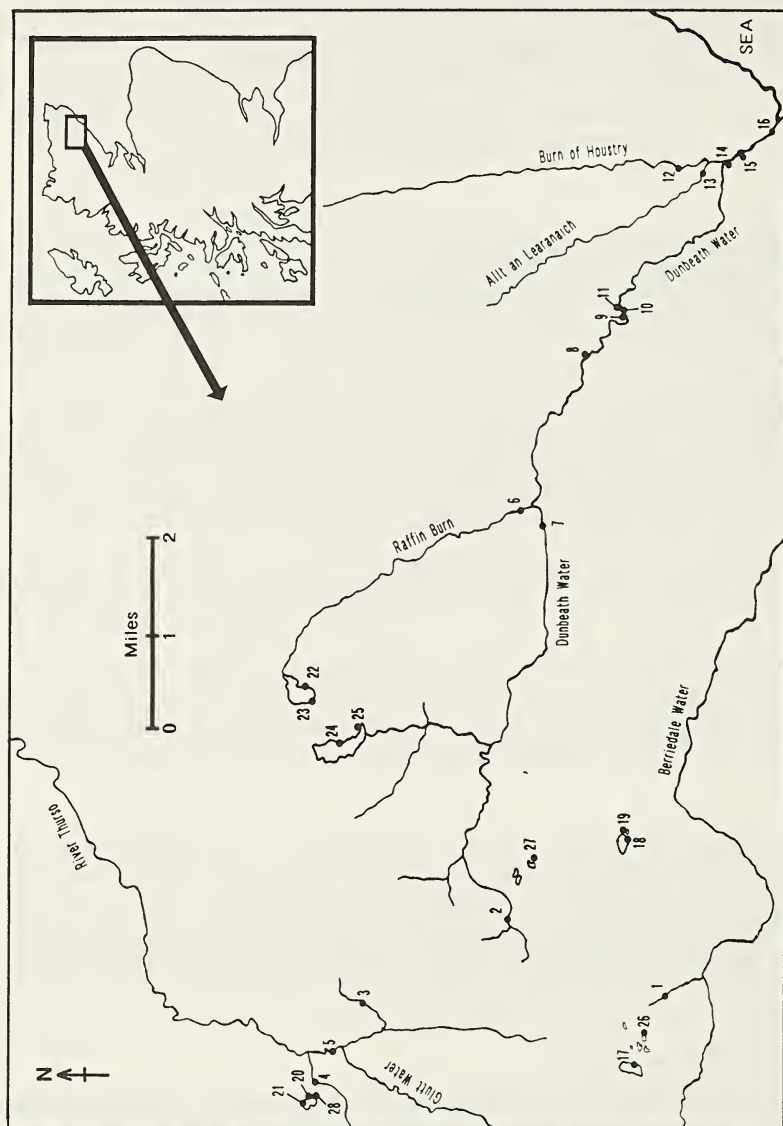


Fig. 1. Map of the study area, showing localities numbered as in Table 1.

Table 1. Site details and sampling dates.

Site No.	Location	Grid Ref.	Sampling Dates
1	Burn to Berriedale Water	ND 012 313	20.11.86
2	Dunbeath Water	ND 025 340	14.11.86, 24.4.87, 7.9.87
3	Burn to Glutt Water	ND 009 366	14.11.86, 24.4.87, 7.9.87
4	Burn to Glutt Water	NC 995 374	14.11.86, 24.4.87, 7.9.87
5	Glutt Water	ND 001 370	14.11.86, 24.4.87, 7.9.87
6	Raffin Burn	ND 095 338	13.12.86, 1.5.87, 3.9.87
7	Dunbeath Water	ND 093 335	13.12.86, 1.5.87, 3.9.87
8	Dunbeath Water	ND 122 328	13.12.86
9	Dunbeath Water	ND 128 321	13.12.86, 1.5.87, 3.9.87
10	Dunbeath Water	ND 129 322	13.12.86, 1.5.87
11	Pool at cemetery	ND 130 323	13.12.86
12	Burn of Houstry	ND 155 312	13.12.86, 1.5.87, 3.9.87
13	Allt an Learanaich	ND 154 307	13.12.86, 1.5.87, 3.9.87
14	Dunbeath Water	ND 157 304	13.12.86
15	Dunbeath Water	ND 158 302	13.12.86, 1.5.87, 20.8.87
16	Dunbeath Water	ND 165 295	13.12.86, 16.5.87, 9.9.87
17	Loch Braigh na h'Aibhne	NC 998 317	20.11.86, 8.5.87, 9.9.87
18	Lochan nam Bo Riabhach	ND 038 319	19.11.86, 24.4.87, 7.9.87
19	Pond at Lochan nam Bo Riabhach	ND 039 319	19.11.86
20	Glutt Loch	NC 993 374	14.11.86, 24.4.87, 7.9.87
21	Glutt Loch	NC 992 375	14.11.86, 24.4.87, 7.9.87
22	Loch Breac	ND 064 375	30.11.86, 17.6.87
23	Loch Breac	ND 062 374	30.11.86, 17.6.87
24	Loch Dubh	ND 054 369	30.11.86, 17.6.87
25	Loch Dubh	ND 056 366	30.11.86, 17.6.87
26	Dubh lochans, Braigh na h'Aibhne	ND 00 31	7.9.87
27	Dubh lochans, Cnoc Gleannain	ND 03 33	7.9.87
28	Peat pools, Glutt Loch	NC 993 373	23.4.87, 7.9.87

minute “kick” sample was taken with a 0.05 mm standard F.B.A. water sampling net, downstream from the area of maximum disturbance (i.e. the net was swept through the water for one minute after stirring up the substrate by kicking to dislodge the animals and the process was then repeated for another minute). This was followed by a two minute “stone turning” sample where invertebrates were collected directly from larger stones and washed from aquatic plants. The sample was then rough sorted on site to remove predators and preserved in solutions of either 4% formalin or 70% alcohol.

The scope of this survey was limited to a twelve-month sampling period. Attention was therefore focused on certain invertebrate groups: Trichoptera (caddis flies), Plecoptera (stoneflies),

Ephemeroptera (mayflies), Coleoptera (beetles), Odonata (dragon- and damselflies) and Diptera-Chironomidae (non-biting midges). Tricladida (flatworms), Mollusca (snails and bivalves) Hirudinea (leeches) and Crustacea were also recorded. The main literature used to assist identification is cited in 'References'.

The chemical analysis of the water was carried out using standard colorimetric techniques with Aquamerck reagent kits.

Site information

The sampling sites fall into four categories: running water, lochs, dubh lochans and semi-permanent pools. These are indicated by numbers on the map (Fig. 1) and are named with National Grid References in Table 1.

Dunbeath Water, the main area of running water, is fed by three main burns: Raffin Burn, Allt an Learanaich and Burn of Houstry, all three having a south-east trend (Fig.1). The section of the River Thurso catchment included within the survey flows towards the north-east. The Glutt Water, the main tributary sampled, rises from small burns draining land east of Knockfin Heights at approximately 350 m. The Dunbeath Water and all three burns have a basically stony substratum, but in areas where the flow rate is generally slower, organic debris accumulates allowing a greater diversity of macrophytes to flourish.

The loch sites showed a greater variation in substratum compared with running water sites, ranging from silt and coarse sand to small stones and cobbles.

The dubh lochans, which are sometimes only a few metres in diameter and often totally surrounded by sphagnum moss, had a substrate of mixed fine and coarse organic debris up to about 30 cm deep.

Results

Chemical analysis of the water

In general Dunbeath Water could be classed as oligotrophic unproductive water partly due to the lack of phosphate, calcium and nitrogen. However it is usually highly saturated with oxygen: the classification of Diller and Rigler (1975) indicates

Grade 1 water (suitable for game fishing). There is only one anomaly in the calcium and acid binding capacity at site ND 158 302, which shows slight increase possibly owing to the presence of a limestone gorge upstream of the sampling site. Low test results point to the absence of polluting ammonia, nitrates and nitrites, which may indicate conversion by bacteria. The pH of all running water sites except one (the Burn to Berriedale Water) was in the range 7.0–7.5. Poor unproductive water which is low in nutrients generally shows pH >7.0.

Of the lochs and lochans tested, Loch Breac and Loch Dubh were generally neutral, with a pH range of 6.0 (after heavy rain the previous week) to 7.4. The water was highly oxygenated. Calcium and nitrate levels were also comparatively low. Three other lochs and dubh lochans tested were all acidic with a pH range 6.6 to <4.5.

Species recorded

Only presence of species is recorded below. Quantitative data can be found in Spirit and Ryrie (1988). The numbers represent localities as given in Table 1.

* = new to Caithness (V.C. 109).

PLATYHELMINTHES	
TURBELLARIA	
TRICLADIDA	
PLANARIIDAE	
<i>Polycelis nigra</i> (Ehrenb.)	
or <i>P. tenuis</i> (Ijama)	13.
<i>P. felina</i> (Dalyell)	2,6,10,15,16.

ANNELIDA	
HIRUDINEA	
GLOSSIPHONIDAE	
<i>Glossiphonia complanata</i> (L.)	6.
<i>Helobdella stagnalis</i> (L.)	24.

MOLLUSCA	
GASTROPODA	
HYDROBIIDAE	
<i>Potamopyrgus jenkinsi</i> (Smith)	15.
LYMNAEIDAE	
<i>Lymnaea peregra</i> (Muller)	6,9,12.
ANCYLIDAE	
<i>Ancylus fluviatilis</i> Muller	5,8,9,13,16.
BIVALVIA	
SPHAERIIDAE	
<i>Sphaerium corneum</i> (L.)	23.
<i>Pisidium casertanum</i> (poli)	25.
<i>P. liljeborgii</i> Clessin	25.
<i>P. nitidum</i> Jenyns	24.

ARTHROPODA

CRUSTACEA

AMPHIPODA

GAMMARIDAE

- Gammarus lacustris* Sars 18,22,23.
G. zaddachi Sexten 16.

INSECTA

EPHEMEROPTERA

SIPHONURIDAE

- Siphonurus lacustris* Eaton 2,6,7,9,10,16.
Ameletus inopinatus Eaton 5.

BAETIDAE

- Baetis rhodani* (Pictet) 3,4,5,6,7,9,10,12,13,14,15,16.
B. muticus (L) 6,8,13,15,16.
B. niger (L) 13.
Proclleon bifidum (Bengtsson) 4,5.

HEPTAGENIIDAE

- Rhithrogena semicolorata* (Curtis) 2,3,4,5,6,7,8,9,10,12,13,14,15,16.
Heptagenia lateralis (Curtis) 2,12,15,16.
Ecdyonurus venosus (Fabricius) 4,7,9,10,12,13,15,16.
E. dispar (Curtis) 6,7,8,9,10,12,13,14,15,16,22,23,24,25,26.

LEPTOPHLEBIIDAE

- Leptophlebia marginata* (L) 10.
L. vespertina (L) 1,2,3,5,6,8,12,18,20,21,22,24,25,26.
Paraleptophlebia sp. 2,17.
P. submarginata (Stephens) 6,12,16,24.

EPHEMERELLIDAE

- Ephemerella ignita* (Poda) 22.

CAENIDAE

- Caenis moesta* Bengtsson 9,16.
 = *luctuosa* (Burmeister)
C. horaria (L) 7,12,16.
C. rivulorum Eaton 10,12,15.

ODONATA

COENAGRIIDAE

- Pyrrhosoma nymphula* (Sulzer) 21.
Ischnura elegans (van den Linden) 27.

AESHNIDAE

- Aeshna juncea* (L) 1,21,26.

LIBELLULIDAE

- Libellula quadrimaculata* (L) 27.
Sympetrum danae (Donovan) 27.
S. nigrescens Lucas 27.

PLECOPTERA

TAENIOPTERYGIDAE

- Brachyptera risi* (Morton) 4,13,15.

NEMOURIDAE

- Protonemura meyeri* (Pictet) 4,5,6,7,9,12,13,14,15.
Amphinemura sulcicollis (Stephens) 2,4,5,6,7,8,9,10,12,13,14,15,16.
Nemoura avicularis Morton 8,10.
N. cinerea (Retzius) 20,22,28.

LEUCTRIDAE

- Leuctra fusca* (L) 3,16,22.
L. hippopus Kempny 2,3,4,5,6,7,8,9,10,12,13,14,15,16.
L. inermis Kempny 4,6,8,9,12.
L. nigra (Olivier) 5.

CAPNIIDAE

- **Capnia atra* Morton 1,2,3,4,6,7,8,10,22,23,24,25.
 **C. bifrons* (Newman) 4,24.

PERLODIDAE

- Perlodes microcephala* (Pictet) 2,5,9,12,13,15,16.
Diura bicaudata (L) 7,13.
Isoperla grammatica (Poda) 1,4,5,6,7,8,13,14,15,23.

PERLIDAE

- Dinocras cephalotes* (Curtis) 12,13.
Perla bipunctata Pictet 5,6,10,13,22.

CHLOROPERLIDAE

- Chloroperla torrentium* (Pictet) 2,4,5,6,7,8,9,10,12,13,15,16,24.
 **C. tripunctata* (Scopoli) 12.

HEMIPTERA

VELIIDAE

- Velia saulii* Tamanini 2,5,9,23,26.

GERRIDAE

- Gerris odontogaster* (Zetterstedt) 26,27.

CORIXIDAE

- Glaenocoris propinqua* (Fieber) 17,18.
Callicorixa wollastoni (Douglas & Scott) 18,19,20,26,27.
Arctocoris carinata (Sahlberg) 18,20,26,27.
A. germari (Fieber) 17.
Sigara nigrolineata (Fieber) 2,20,27.

COLEOPTERA

HALIPLIDAE

- Haliplus lineatocollis* (Marshall) 11.

DYTISCIDAE

- Hydroporus erythrocephalus* (L) 17,18,21,27.
H. gyllenhalii Schiodte 11,18,20.
H. nigrita (Fabricius) 11.
H. obscurus Sturm 17,18,27.
H. palustris (L) 18,25.
H. pubescens (Gyllenhal) 11,19,20,21,26.
H. tristis (Paykull) 20.

- Pomatonectes depressus* (Fabricius) 21.
P. griseostriatus (Degeer) 17,18,19,21,27.
Oreodytes alpinus Paykull 15.
O. davisi (Curtis) 4,5,7.
O. sanmarki (Sahlberg) 2,4,5,7,12,15.
O. septentrionalis (Gyllenhal) 5,6,7,9,10,12,15.
Platambus maculatus (L) 2,6.
Agabus arcticus (Paykull) 17,18,19,20,21,26,27.
A. bipustulatus (L) 17,18,19,26.
Acilius sulcatus (L) 1,26,27.
- GYRINIDAE**
- Gyrinus minutus* Fabricius 26,27.
G. opacus Sahlberg 17,26,27.
- HYDRAENIDAE**
- *Ochthebius exsculptus* Germar 12.
Hydraena gracilis Germar 5,12,13,15.
- ELMIDAE**
- Elmis aenea* (Muller) 5,6,22,23.
Esolus parallelepipedus (Muller) 10,12,15.
Limnius volkmari (Panzer) 2,10,12,16,24.
Oulimnius tuberculatus (Muller) 2,5,6,9,10,12,13,15,18,22,24,25.
- CHRYSOMELIDAE**
- Donacia/Plateumaris* sp. 1,6,21,26.
- TRICHOPTERA**
- RHYACOPHILIDAE**
- Rhyacophila dorsalis* (Curtis) 2,4,7,9,12.
- GLOSSOSOMATIDAE**
- *Glossoma conformis* Neboiss 12.
Agapetus fuscipes Curtis 17.
- HYDROPTILIDAE**
- Sp. indet.* 5,23.
- PHILOPOTAMIDAE**
- *Philopotamus montanus* (Donovan) 12,13.
- POLYCENTROPIDAE**
- Plectrocnemia conspersa* (Curtis) 2,3,6,9,15,20,22,24.
P. geniculata McLachlan 13.
Polycentropus flavomaculatus (Pictet) 2,4,5,6,9,10,12,13,15,17,18,20,21,22,23,24,25,26,27.
Cyrnus flavidus McLachlan 17,26,27.
C. trimaculatus (Curtis) 24.
- PSYCHOMYIIDAE**
- Tinodes waeneri* (L) 10,17,23,24.
- HYDROPSYCHIDAE**
- Hydropsyche pellucidula* (Curtis) 8,9,10,12,13.
H. siltalai Dohler 6,7,8,9,10,13.

PHRYGANEIDAE

- Phryganea bipunctata* (L) 6,19,26,27.
Agrypnia obsoleta (McLachlan) 17,19,21,26.

LIMNEPHILIDAE

- Apatania wallengreni* McLachlan 22.
 **Drusus annulatus* Stephens 4,6,7.
Limnephilus stigma Curtis 1,6,19,20,21,24,27,28.
Nemotaulius punctatolineatus (Retzius) 26,27.
Anabolia nervosa Curtis 9,22,24.
Potamophylax cingulatus (Stephens) 2,5,6,7,8,10,13,17,20,22,23,24.
 or *P. latipennis* (Curtis)
Chaetopteryx villosa (Fabricius) 3,4,5,6,9,10,22,24,25.

LEPTOCERIDAE

- Athripsodes* sp. 6.

MOLANNIDAE

- Molanna palpa* McLachlan 17,21.

SERICOSTOMATIDAE

- Sericostoma personatum* (Spence in Kirby & Spence) 6,7,9,22,24,25.
Lepidostoma hirtum (Fabricius) 9,12,22,24

DIPTERA

CHIRONOMIDAE

- **Macropelopia goetghebueri* (Kieffer) 13
 **Nilotanytus dubius* (Meigen) 7.
 **Paramerina cingulata* (Walker) 12.
Trissopelopia longimana (Staeger) 5,12,13.
Potthastia gaedii (Meigen) 12.
 **P. longimanus* Kieffer 16.
 **P. sp.* (Pe 1 – *sensu* Langton 1984) 12.
 **Cricotopus (Cricotopus) albiforceps* (Kieffer) 7.
 **C. (C.) annulator* Goetghebuer 9.
C. (C.) bicinctus (Meigen) 13.
 **C. (C.) pulchripes* Verrall 6,9.
 **Eukiefferiella clypeata* (Kieffer) 16.
 **E. devonica* (Edwards) 10.
 **E. tirolensis* Goetghebuer 16.
 **Tvetenia discoloripes* (Goetghebuer) 12.
 **Heterotrissocladius marcidus* (Walker) 2.
 **Orthocladius (Orthocladius) frigidus* (Zetterstedt) 10.
Orthocladius (O.) oblidens (Walker) 5.
 **O. (O.) sp.* (Pe 4 – *sensu* Langton 1990) 5.
 **O. (O.) pedestris* Kieffer 16.
 **O. (O.) rubicundus* (Meigen) 9,10.

* <i>O. (Euorthocladius) ashei</i> Sopenis	10.
* <i>O. (E.) rivulorum</i> Kieffer	16.
* <i>Psectrocladius (Psectrocladius)</i> <i>oxyura</i> Langton	25.
* <i>Dicrotendipes modestus</i> (Say)	25.
* <i>Stictochironomus histrio</i> (Fabricius)	25.
<i>Micropsectra atrofasciata</i> Kieffer	12,13.

Discussion

The fauna and flora of the Dunbeath freshwater systems are influenced by many factors. The water of the rivers and burns is nutrient-poor, partly due to the mineral-poor surrounding peatlands. The northern latitude restricts water temperature, keeping it cool but rich in dissolved oxygen. The survey has shown that there is reduced diversity of certain groups, especially molluscs, crustaceans and leeches, indicating the oligotrophic nature of the water. However, other species which prefer cool, clean, well oxygenated water are plentiful and varied. These include stoneflies, mayflies, beetles and certain species of caddisflies.

The survey yielded some species which are upland/moorland specialists, including the water bugs *Glaenocoris propinqua*, *Arctocoris carinata*, *A. germari* and *Callicorixa wollastoni*, and the water beetle *Gyrinus opacus*. A significant find was the water beetle *Oreodytes alpinus*, an ancient relict species which had only been discovered for the first time in Britain during the 1985 Caithness Survey (Foster and Spirit, 1986).

Raffin Burn (a good example of a running water site) was sampled on a slower stretch. This had 9 species of water plants which encouraged a more diverse fauna: 10 species of caddisfly, 9 species of stonefly and 8 species of mayfly; it was at this site that one of the two leeches was found.

Loch Dubh and Loch Breac, although classed as oligotrophic due to the low level of nutrients, were found to have a neutral pH and could support populations of freshwater amphipods, small bivalve molluscs and a comparably fair selection of stoneflies, mayflies and caddis flies.

The dubh lochans, also known as "the Flows", have in the past been considered "barren" or "infertile". However, most of these acidic sites can support communities of invertebrates: caddisfly

larvae, water bugs, water beetles, dragonfly larvae, alderfly larvae and fly larvae. Molluscs and amphipods are absent, probably because the lack of calcium carbonate would inhibit their physiological processes. Fish are also absent from these pools, although the larger lochs can support small populations of trout with some specimens reaching considerable size. Tadpoles of the common frog *Rana temporaria* (L.) were common in the pools.

Cnoc Gleannain is an example of a typical dubh lochan system. It is characterised by the emergent vegetation which includes bogbean, bog-cotton and a variety of *Sphagnum* species. The larval stages of three species of dragonflies and damselflies were seen which until recently had been recorded only as adults in the county: *Ischnura elegans*, *Libellula quadrimaculata* and *Sympetrum nigrescens*. *Nemotaulius punctatolineatus* was one of the 5 species of caddis living in these dubh lochans. An internationally rare species, it was seen for the first time in 1985 as a larva in Caithness, having been seen only once before at Aviemore, Scotland in 1965 as an adult; it uses bogbean as a food source and case-building material.

Acknowledgments

We are grateful to all who assisted us with this project, including the Dunbeath Estate staff, especially Mr and Mrs C. Scott, to Mr A. J. R. Spirit for general advice and field work and to the experts who validated specimens: Dr G. N. Foster, Dr M. Kerney, Dr P. H. Langton, Mr S. Moran and Dr I. D. Wallace.

References

- ARNOLD, F. & MACAN, T.T., 1969. Studies on the Fauna of a Shropshire Hill Stream. *Fld Stud.* 3: 159-184.
- BRAY, R.P., 1967. The taxonomy of the larvae and pupae of the British Phryganeidae (Trichoptera). *J. Zool., Lond.* 153: 223-244.
- DILLON, P.J. & RIGLER, F.H., 1975. A Simple Method for Predicting the Capacity of a Lake for Development Based on Lake Trophic Status. *J. Fish. Res. Bd. Can.* 32: 1519-1531.
- EDINGTON, J.M. & HILDREW, A.G., 1981. A key to the Caseless Caddis Larvae of the British Isles with notes on their ecology. *Scient. Publs Freshwat. Biol. Ass.* No. 43.
- ELLIOTT, J.M. & MANN, K.H., 1979. A key to the British Freshwater Leeches. *Scient. Publs. Freshwat. Biol. Ass.* No. 40.

- ELLIOT, J.M., HUMPECH, U.H. & MACAN, T.T. 1988. Larvae of the British Ephemeroptera: a Key with Ecological Notes. *Scient. Publs Freshwat. Biol. Ass.* No. 49.
- FOSTER, G.N. & SPIRIT, M.G., 1986, *Oreodytes alpinus* new to Britain. *Balfour-Browne Newsletter*, 36:1-2.
- GLEDHILL, T., SUTCLIFFE, D. & WILLIAMS, W.D., 1976. A Revised key to the British Species of Crustacea: Malacostraca occurring in fresh water with notes on their ecology and distribution. *Scient. Publs Freshwat. Biol. Ass.* No. 32.
- HAMMOND, C.O., 1985. *The Dragonflies of Great Britain and Ireland*. Harley Books, Colchester.
- HICKIN, N.E., 1967. *Caddis Larvae*. Hutchinson & Co., London.
- HILEY, P.D., 1972. The taxonomy of the larvae of the British Sericostomatidae. *Entomologist's Gaz.* 23:105-119.
- HILEY, P.D., 1976. The identification of the British limnephilid larvae (Trichoptera). *Systematic Entomology* 1:147-167.
- HYNES, H.B.N., 1977. A key to the Adults and Nymphs of the British Stoneflies (Plecoptera), 3rd.Ed. *Scient. Publs Freshwat. Biol. Ass.* No. 17.
- KEATING, T., 1984. *Report on the Habitats of the Dunbeath Estate*. Report submitted to Nature Conservancy Council, Golspie, Sutherland.
- LANGTON, P.H., 1984. *A key to pupal exuviae of British Chironomidae*. Private publication. 324 pp.
- LANGTON, P.H., 1990. *A key to pupal exuviae of West Palaearctic Chironomidae*. Private publication. c.450 pp.
- LEADER, J.P., 1968, The larvae of *Molanna palpata* and some further characters of the larvae of *M. angustata*. *Entomologist's Gaz.* 19:21-29.
- MACAN, T.T., 1976. A Revised Key to the British Water Bugs (Hemiptera-Heteroptera) 2nd. Ed. *Scient. Publs Freshwat. Biol. Ass.* No. 16.
- MACAN, T. T., 1979. A Key to the Nymphs of British Ephemeroptera, 3rd. Ed. *Scient. Publs Freshwat. Biol. Ass.* No. 20.
- MASON, C. F., 1988. *Biology of Freshwater Pollution*. Longman.
- SAVAGE, A.A., 1989. Adults of the British Aquatic Hemiptera-Heteroptera: a Key with Ecological Notes. *Scient. Publs Freshwat. Biol. Ass.* No. 50.
- SPIRIT, M.G., 1985. *Freshwater invertebrates of Caithness*. Report submitted to Caithness & Sutherland District Council.
- SPIRIT, M.G. & RYRIE, J.L., 1988. *The Freshwater Invertebrates of the Dunbeath Estate, Caithness*. Report submitted to Dunbeath Preservation Trust.
- WALLACE, I.D., 1980. The identification of British limnephilid larvae (Trichoptera: Limnephilidae) which have single-filament gills. *Freshwater Biology* 10: 171-189.
- WALLACE, I.D., 1981. A key to the larvae of the family Leptoceridae (Trichoptera) in Great Britain and Ireland. *Freshwater Biology* 11:273-297.

The Ferns of Ailsa Craig and their Distribution

BERNARD ZONFRILLO

Zoology Department, University of Glasgow,
Glasgow G12 8QQ.

The flora of Ailsa Craig has for long been a subject of interest to visiting botanists. Thomas Pennant, in 1774 produced his travelogue, *A Tour in Scotland and Voyage to the Hebrides*, which contained the first attempt at compiling a flora of Scotland and included records from Ailsa Craig. Smith, Paterson and Watt in 1900 then attempted to bring together most known records in their paper on the Natural History of Ailsa Craig. They gave some brief, but often vague or inaccurate notes on distribution. However it was not until 1933 that John R. Lee, in his famous *Flora of the Clyde Area*, brought together and denoted the flora of Ailsa Craig within the scope of that work. In 1972 John Mitchell undertook the task of listing all the published and unpublished botanical records from Ailsa Craig, and these were published under the title *Two Centuries of Botanical Recording on Ailsa Craig*. This is now regarded as a checklist of the Flora of Ailsa Craig. The plants listed, however, are virtually without comment on their distribution on Ailsa Craig, although the author does comment upon a few select species in the text, and mentions the natural and man-produced effects on the vegetation of Ailsa Craig.

Lee (1933) listed seven species of ferns and Mitchell (1972) listed ten species. All of the latter have been located during the 1980-1990 period. Included here are all ferns recorded from Ailsa Craig and comment is made on their present distribution and abundance on the island. The text is based on visits to Ailsa Craig made at all months of the year and for spells of several weeks at a time. Place names largely follow the early map reproduced from Lawson (1895) (Fig. 1). Specimens collected for identification have been lodged in the herbaria at the Art Gallery & Museum, Kelvingrove, Glasgow and at the Botany Department, University of Glasgow.



Fig. 1. Map of Ailsa Craig from 1890s showing earliest known place names.

The Ferns of Ailsa Craig

Pteridium aquilinum Bracken

Bracken occurs abundantly on Ailsa, growing to 2 metres high in some sheltered places. The basal area from the Blue Hone Quarry at the north to the area around the South Foghorn has Bracken in abundance. At Craignaon it often suffers attacks from caterpillars of the Buff-tip Moth. It tends to be missing from the nitrophilous areas immediately below the Gannet colony. On the upper slopes, it thrives around the Castle area and on the ridges above. On the south west slopes at Clashwaun, it also occurs among the broken granite blocks and on dolerite substrates. There are stands on the north east slopes amidst the gull colonies. It is also found on the damp hollows of sediment such as at the Garry Loch, which, when full, is alkali, but dries up during warm spells. It grows sparsely among the limited heather banks on the southern eastern slopes and is found in a small form near to the summit (1114 feet), where it is modified by the action of the wind.

Phyllitis scolopendrium Hart's-tongue Fern

Occurring on mainly man-made structures, this fern was not on Lee's 1933 list. Its presence may be associated with the building of the Lighthouse and its additional structures from 1883 onwards, since it is present in good numbers on the side-ports of the old iron gasometers. These are damp, 10 metre deep brick structures, built in the early years of this century when the Lighthouse was gas-burning. It also occurs at one or two natural gullies in the granite, and on dolerite seams such as at the Loups and at Dalton's Cove, but not in as big a form as at the gasometers.

Asplenium adiantum-nigrum Black Spleenwort

This is perhaps the scarcest fern on Ailsa Craig. It is found in the ruins of the Castle at 120 metres above sea level. Only small specimens have been located on the upper vegetated areas near Blue Hone Quarry. In the areas where it is found, it is not common, preferring the damp north facing parts of the island to any other aspect.

Asplenium marinum Sea Spleenwort

A cave and crack-dwelling fern of the south and north east aspects of Ailsa. At MacNalls cave it grows robustly, manured by the guano from the Gannets breeding above, and to around 350 mm in length, the pinnules are notably elongate (Fig. 2). At the Loups caves and at Swine Cave it is present in a more normal size and form. It also grows from the sheltered cracks at Dalton's Cove and at the Loups caves.

Asplenium trichomanes Maidenhair Spleenwort

Again, a plant not noted by Lee, but today a very obvious and common species associated with the walls and structures of the Lighthouse enclosures. It occurs on the south facing granite wall of the gasometer area and there its vigour, and that of Ivy-leafed Toadflax, is clearly influenced by summer rainfall. In dry summers it fades quickly but after a period of rain it reappears just as rapidly and in a fresh green colour. It grows out of the brick-built side ports of the gasometers and on one or two other man-made structures. It is found growing



Botanical name: *Asplenium marinum*

Vernacular name: SEA SPEARWORT

Locality: MACNALL'S CAVE

Altitude: 10m.

Date: 22 July 1990

Fig. 2. Reduced photostatic copy of the MacNall's Cave specimen of *Asplenium marinum* from Ailsa Craig (Scale line 50 mm).

Notes: AFRAYOLD AND LARGE PLANT GROWING FROM ROOF OF CAVE.

Collector: B. Zedillo

No.

from natural rock along the ridge from the South Cottage to Craignaun, but is not abundant in such situations. A few plants have been found at the Trammins, on dolerite.

Asplenium ruta-muraria Wall-rue

This fern is present in small quantity, mainly on the south-facing walls enclosing the gasometers. A few plants also grow on the inner walls of the ruined Smiddy building and on the brick walls of the gashouse. A single plant was also found at Dalton's Cove. It is not common, being restricted mainly to the walled areas. A plant was noted on the Castle walls but there are no records from above that altitude. It is easily overlooked in the early part of the year.

Athyrium filix-femina Lady Fern

A few fronds grow within the brick side ports of the gasometers. It is commonest on the well vegetated slopes at the Loups caves, where it can sometimes grow in profusion. It also occurs on the upper ridges to around 200 metres a.s.l.

Dryopteris affinis Golden Fern

Specimens of "Male Fern" from Ailsa have proved to be only of the "Golden fern", a recently separated species, now considered distinct from *D. filix-mas* and split into several subspecies. It grows commonly in small tufts around the basal screes and on the more broken upper parts of the island. In the more sheltered ridges it grows fairly tall and broad, and is an obvious fern amongst the darker bracken. It is most abundant on the east side of the island between the north and south foghorns. All specimens examined to date are of the subspecies *D. affinis* subsp. *affinis*.

Dryopteris dilatata Broad Buckler-fern

Not a common fern on Ailsa, restricted mainly to the man-made gasometer ports, where it does not grow well. It fares better on the dolerite seams and shaded wet seepage cracks such as at the foot of Craignaun, where it attains more normal proportions. It is also present in the Loups caves and at MacNall's Cave where it also grows well beside the Sea Spleenwort.

Polypodium interjectum Interrupted Polypody

Previous botanical lists mention the Polypody which occurs on Ailsa as the Common Polypody *Polypodium vulgare*, however examples from various localities on the island show it to be all *P. interjectum*, another recently differentiated species.

It can be found in discreet areas over much of the east side of the island, including on the level ground amongst the heather in the Gasometer area. There are good stands on the slopes at the Loups and beside the path to the Castle amongst the heather. It grows in damp gullies at the Loups caves and also on sheltered crevices at the east Trammins.

Acknowledgments

I am indebted to The Marquess of Ailsa for the privilege of working on Ailsa Craig. My thanks are due to Dr J. H. Dickson and Mr A. McG. Stirling for verifying identification of the specimens and commenting on the draft.

References

- LAWSON, R. 1895. *Ailsa Craig, its History and Natural History*. 2nd Edition Paisley.
 LEE, J. R., 1933. *The Flora of the Clyde Area*. Glasgow.
 MITCHELL, J., 1972. Two centuries of botanical recording on Ailsa Craig. *Western Nat.* 1: 26-35.
 PENNANT, T., 1774. *A Tour in Scotland and Voyage to the Hebrides* 1772. Chester.
 SMITH, J. PATERSON, J. & WATT, H. B., 1900. The Natural History of Ailsa Craig. *Ann. Anderson. Nat. Soc.* 2: 135-154.

Book Review

Eagles

JOHN A LOVE

Whittet Books Ltd., 18 Anley Road, London W14 0BY, 1989,
 128 pp., 80 line illustrations. Hardback, ISBN 0 905483 79 0,
 £6.95.

This book is the latest in a popular series of Natural History "mini-monographs" aimed at the general reader. John Love follows the pattern set in previous books in the series such as *The Robin* by Chris Mead. This approach devotes a short chapter of 1 to 5 pages to each of a wide-ranging series of topics about eagles from their identification, biology, distribution and classification, through radio-tagging and re-introduction, to folklore and falconry. The factual and serious parts of the text are interspersed with more light-hearted and anecdotal accounts which make for easily digested reading. There is a wealth of illustration by the author which follows a similar pattern to the text in that he includes a number of humorous drawings among more considered graphic studies.

Written by the man who supervised the re-introduction of the Sea Eagles to Rhum this book combines his enthusiasm and general knowledge of eagles with a surprising amount of factual information in an entertaining form for the non-bird watcher as well as the more experienced. At £6.95 hardback it is good value.

THOMAS R. DANIELS

Memoirs of a Midden Mavis — The Study of Ancient Diets and Environments from Plant Remains

CAMILLA DICKSON

Botany Department, University of Glasgow.

The Goodfellow lecture delivered on 8 May, 1990

Ancient midden deposits are a rich source of information for the environmental archaeologist, who is really a midden raker, in that the midden mavis gains something useful from what others throw away.

Ancient refuse deposits are found in pits, wells, on floors and forming the wall cores of houses as well as in ditches and lake dwellings. These midden deposits often contain plant and animal remains yielding much information on the past environment and diet of man.

The Goodfellow lecture is traditionally on some aspect of microscopy. It is the details of cell structure, revealed by the microscope, which enable identification of plant fragments in addition to that of whole seeds. By identifying this plant material, aspects of the past environment and sometimes past diets can be reconstructed.

My first example is from the Roman fort at Bearsden (Dickson, 1989, Dickson & Dickson, forthcoming) a suburb just north west of Glasgow. Bearsden is one of the Antonine Wall forts and was occupied between 142 and 158 A.D. The fort was excavated in the 1970s by Dr D. J. Breeze of the Historic Buildings and Monuments branch of the Scottish Development Department which financed the environmental work. My husband heard of the excavation and first visited it when the outer ditch of the east annexe was being excavated. He jumped down into the ditch and examined the cut vertical face of the ditch infill. In true Sherlock Holmes style

(his names are James Holms) he whipped out his magnifying glass (hand lens) and began searching for clues. He noted tufts of moss and tiny fragments of charred wood protruding from the ditch section. These clues suggested that the ditch might contain remains from the Roman occupation. Accordingly samples were taken in columns from top to bottom of the ditch and transported back to the laboratory for analysis.

In the absence of a Dr Watson to follow up the clues, I was given the task of sieving away the ditch silts and identifying the various plant remains, using a low power stereo-microscope. Continuous waterlogging will preserve the outer coats of fruits and seeds, pollen grains and much else. The seeds of most species are sufficiently distinctive to identify them to the species level in the absence of flowers and other vegetative parts. The cell pattern of seeds can be so distinctive that even seed fragments can be identified, to the species level in some instances. Single moss leaves can usually be similarly identified and magnifications of x500 are commonly used to observe the fine detail.

Wing cases of beetles and bugs, wings and pupae of flies, bodies of fleas and mites, in fact any durable parts of invertebrates can be identified to some degree by the appropriate specialist. All these identifications will help to build up a picture of the local environment and examples of all these types of remains were recovered from the ditches of the Bearsden fort.

The ditch silts proved very rewarding; seeds of figs (*Ficus carica*) (Pl. 1), coriander (*Coriandrum sativum*), dill (*Anethum graveolens*) and wild celery (*Apium graveolens*), as whole seeds or as fragments were among the many different plants represented. These suggested that the ditch contained the remains of food issued to the Roman soldiers over 1800 years ago.

Gardeners will know that figs do not ripen well outdoors in Scotland without protection at the present time, and the climate some 2000 years ago was probably not unlike that of today. Figs grow well in the Mediterranean region; it is known that amphorae of wine from Spain and pottery from southern England would be transported in large cargo vessels to the Antonine garrison, berthing at harbours which must have existed in the firths of Clyde and Forth. It is probable that coriander, dill and celery seeds also came from the Mediterranean. The seeds were used both as spices and

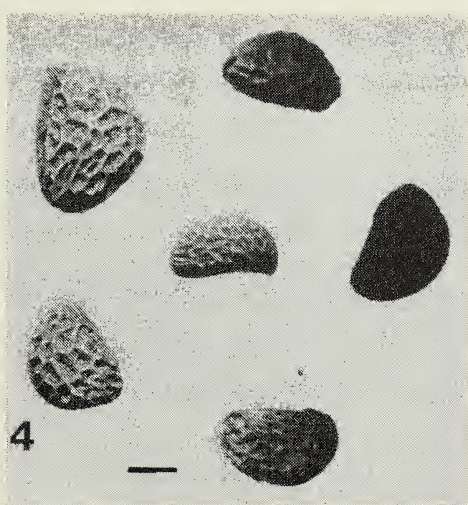
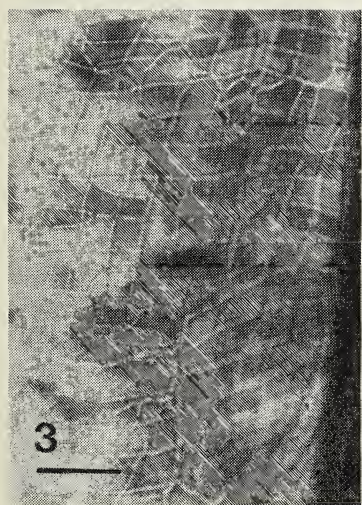
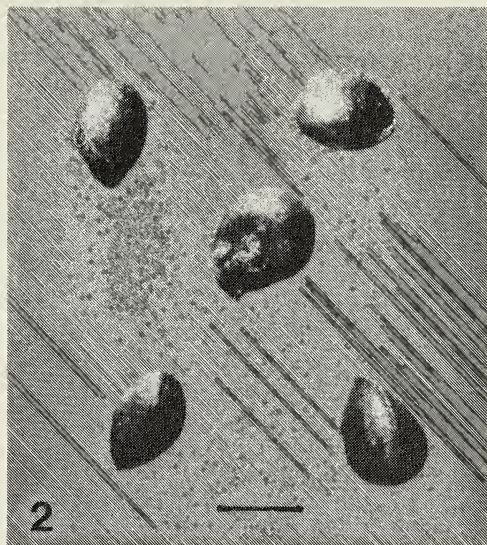


Plate 1: Plant remains from; (1) to (3) ditch at Roman Fort at Bearsden, Glasgow; (4) Old Kilpatrick crannog. (1) Cereal bran — ground up testa. The dark lines are the hilums (scale bar = 1.0mm); (2) *Ficus carica* (fig) seeds (scale bar = 1.0mm); (3) *Triticum/Secale* (wheat/rye) testa (scale bar = 50 μ); (4) *Rubus fruticosus* agg. (bramble) and (centre) *R. idaeus* (raspberry) fruit-stones (scale bar = 1.0mm).

medicinally by the Romans. Linseed (*Linum usitatissimum*) was found as rare seed fragments. Linseed was used by the Romans for poultices as was also the custom in Britain until recent times. Rare fragments of opium poppy (*Papaver somniferum*) seeds may relate to the Romans enjoying the seeds sprinkled on bread, another custom of ours with a long history.

Clusters of pollen of the common mallow (*Malva sylvestris*) were found only in the Roman levels, but no seeds were seen. It seems probable that mallow flowers, and perhaps leaves, were deliberately eaten by the Romans for their medicinal properties and perhaps purposely grown at Bearsden. Pliny, in his Natural History written in the first century A.D., gives numerous medicinal uses for mallows and states that anyone taking half a *cyathus* (about 20cc) daily of any of the mallows will that day be immune to all diseases. In other words some mallow a day keeps the doctor away. Mallows are still used in herbal remedies, both internally and externally.

Pulses were represented by tiny seed fragments of the field bean (*Vicia faba*), an ancestor of the broad bean. There were probable fragments of lentils (*Lens culinaris*) also. There is documentary evidence to show that beans and lentils were the vegetables most commonly eaten by the Roman soldiers.

Fresh fruit was gathered locally. There were occasional pips of raspberry (*Rubus idaeus*), bramble (*Rubus fruticosus* agg.) and wild strawberry (*Fragaria vesca*) with rare seeds of bilberry (*Vaccinium myrtillus*) and fragments of hazel nut shells (*Corylus avellana*).

Although these are all of great interest, since they were at the time new Roman records for Scotland, the most surprising find was that of cereal bran (Plate 1). The bran fragments resemble those in wholemeal flour, minus the floury particles. The bran made up about half the plant material in the ditch. The puzzle was how did all the bran get into the ditch? Was it from flour contaminated with grain weevils, of which we found numerous fragments, or could the flour have been mouldy? The Roman bran-rich sediments were about a metre in depth; this implied that a very large volume of bran had to be accounted for.

Eventually I decided on a small experiment to try to solve the mystery. I made sure that my diet included wholemeal bread and

a day or two later I kept a sample of the resultant product; it was sieved to leave only the inodorous plant fragments from the faeces. My husband did not know of the experiment; I simply placed some of the faecal plant material under the microscope for him to compare with the Roman bran then told him how I had obtained it. He immediately declared that it was sewage! The bran from the two sources did indeed look very similar, although the recent bran was better preserved. It seemed highly probable that I had been examining a ditch full of Roman sewage. We immediately told Dr Breeze but he was most reluctant to believe that the Romans, renowned for their cleanliness, would have used an outer defensive ditch as a septic tank. We needed proof! My husband discussed the problem with a chemist colleague. Dr Brian Knights, who agreed to examine samples at intervals through the ditch deposits using thin layer and gas chromatography. He was able to show that coprosterols and bile acids were present but, rather surprisingly, levels of cholesterol were low (Knights *et al.*, 1983). Low values of cholesterol are consistent with a largely vegetarian diet. It is probable that wheat products, perhaps mainly eaten as bread, formed a large part of the soldiers' diet. At other Antonine forts, however, bones and shells have been identified giving evidence of meat and shellfish, but these may have been eaten solely on feast days. There were rare fragments of cancellus bone in the ditch suggesting that a little meat was eaten. Dr Knights could only establish that a mammalian diet was indicated, the tests could not definitely pinpoint the faecal material to man.

To try to prove that it was human sewage we turned to the pollen slides which had been prepared from samples taken at intervals through the ditch silts. Eggs of the whipworm, an internal parasite found in the lower gut, were identified from all the Roman levels. These were examined, with the aid of a high power microscope, by Dr Andrew Jones, of York University Environmental Archaeology Unit, who identified them as the eggs of the human whipworm (*Trichuris trichiura*); those of the roundworm (*Ascaris*) were also present.

We were now certain that the ditch contained human sewage. Fragments of weft-forming mosses were identified by my husband; although the Romans usually used sponges for toilet purposes it seems possible that local mosses provided an acceptable substitute. Since then layers of weft-forming mosses have been found in medieval latrines in Britain and elsewhere. The following year's

excavation produced the elusive latrine foundation with a drain leading in the direction of the ditches which were now covered by a block of flats.

We also wanted to know what the countryside looked like when the Romans first invaded Scotland in the 1st century A.D. Did the Roman soldiers have to clear dense forests or had the native Iron Age people begun to clear the woodland?

We turned to pollen analysis to try to answer these questions. After chemical removal of the inorganic and most of the organic matter, microscope slides were prepared of the remaining material which is largely of pollen. Differences in size, apertures and ornamentation enable identification, at the family level for example for grass (Gramineae) and, at the species level for plantains (*Plantago* spp.). Some drawing of pollen and spores by the late Mrs M. Pigott are shown in Fig. 1. About 400-500 land pollen grains were identified in each sample, using a binocular microscope at 500 magnifications. If a sequence of samples is collected, as for instance the column through the ditch deposits at Bearsden, a pollen diagram can be plotted as a series of graphs showing the changing proportions of the pollen types through time as the vegetation changes. Turves, cut from damp pasture, which have remained more or less waterlogged, will record the local vegetation at the time the turf was accumulating.

Fortunately a few of the turves which had been used to build the fort ramparts, had some pollen still remaining in them. The pollen was not well preserved due to fluctuating water levels in the past but there was sufficient countable pollen to show that before

Fig. 1 Examples of pollen and spore types. (a) *Pinus* (pine); (b) *Betula* (tree birch); (c) *Betula nana*-type (dwarf birch); (d) *Corylus* (hazel); (e) *Taxus* (yew); (f) *Juniperus* (juniper); (g) *Ulmus* (elm); (h) Gramineae (grasses); (i) *Quercus* (oak); (j) *Fraxinus* (ash); (k) *Alnus* (alder); (l) *Salix* (willow); (m) *Calluna* (heather); (n) Cyperaceae (cotton grass and sedges); (o) *Plantago lanceolata* (ribwort plantain); (p) *Tilia cordata* (lime); (q) *Artemisia* (wormwood); (r) Compositae (*Taraxacum* type); (s) *Potamogeton* (pondweeds); (t) Umbelliferae, *Heracleum* type (hogweed); (u) *Helianthemum* (rockrose); (v) *Sphagnum* (bog moss) spore; (w) *Selaginella selaginoides* (lesser clubmoss) microspore.

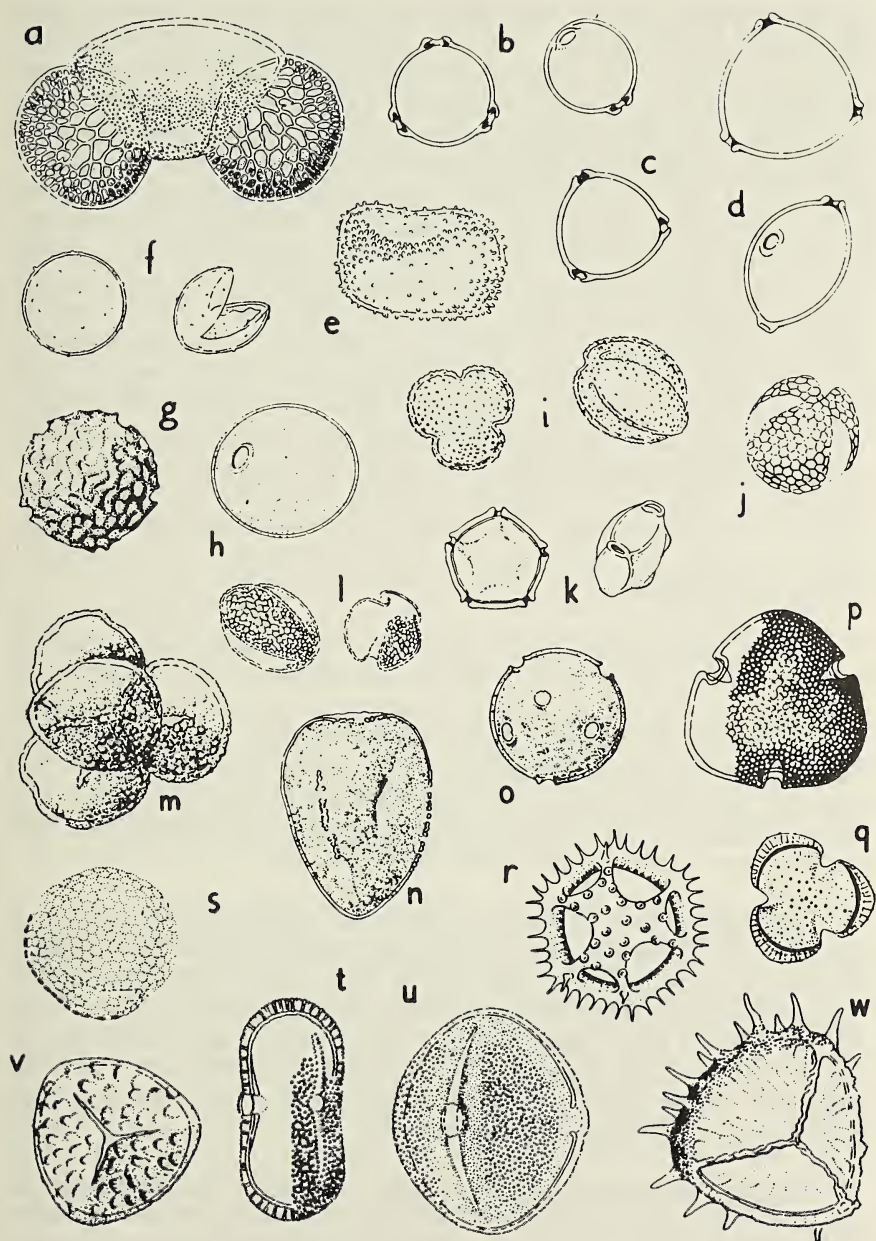


Fig. 1.

the second century fort was built the landscape had been largely cleared of oak (*Quercus*) and birch (*Betula*). Oak and birch are known to have been the most important components of the wildwood in this part of Scotland. There was, however, hazel (*Corylus*) and alder (*Alnus*) pollen and quite high proportions of grass and heather (*Calluna*) pollen too. Ribwort plantain (*Plantago lanceolata*), devil's-bit scabious (*Succisa pratensis*) and pollen of the buttercup family (Ranunculaceae) with bracken (*Pteridium*) spores were also present. The seeds and leaves still preserved in the turves were identified and we began to build up a picture of the landscape which the Roman soldiers moved into. It seems that the turves had been cut from damp pasture, with clumps of rushes (*Juncus* spp.). There were also boggy areas with bog mosses (*Sphagnum* spp.) and drier parts with grassy heathland. The nearby wooded areas were probably limited to hazel scrub with alder and willow (*Salix*) beside the water-courses. By taking pollen and seed samples through the sewage layers and above them and through other defensive ditches, it was possible to build up a fuller picture of the countryside both during and immediately after the short Roman occupation.

The identification of wood and charcoal from the burnt barrack blocks, bathhouse flues and the latrine added to the story. If you snap charcoal with a clean break and examine it with illumination directed through the microscope objective you can see the details of the cells in three dimensions, often perfectly preserved. Wood can be sectioned and thin sections examined at about 500 magnifications. Both wood and charcoal can be identified to the generic level and occasionally to the species.

By identifying numerous pieces of wood and charcoal, it appears that alder not oak was the wood chiefly used for building. Oak was the building timber preferred by the Romans in Britain for its durability and we must assume that oak wood was in short supply. Dr Bill Boyd has pollen analysed exceptionally well-preserved turves from other Roman forts in the neighbourhood of the Antonine Wall and demonstrated that most of the oak had been removed by the Iron Age inhabitants.

The identification of pollen, seeds, mosses, wood and charcoal produced evidence for some 180 taxa, mostly of plants growing around the fort in the 2nd century A.D. The plant communities represented are those of cultivated and waste ground, heaths and

mires including creeping willow (*Salix repens*) an uncommon plant around Glasgow at the present. There are plants of deciduous woodland, birch (*Betula*), hazel (*Corylus*), ash (*Fraxinus*), gean (*Prunus avium*), oak (*Quercus*), rowan (*Sorbus*), holly (*Ilex*), ivy (*Hedera*) and honeysuckle (*Lonicera*). Plants of open woodland include pignut (*Conopodium majus*), bluebell (*Hyacinthoides non-scripta*), red campion (*Silene dioica*), greater stitchwort (*Stellaria holostea*) and bracken (*Pteridium*), a colourful display in early summer. Grassland with harebell (*Campanula rotundifolia*), purging flax (*Linum catharticum*), white clover (*Trifolium repens*) and mosses would grade into fen and marsh, with marsh marigold (*Caltha palustris*), ragged robin (*Lychnis flos-cuculi*), sedges (Cyperaceae) and gypsywort (*Lycopus europaeus*) which is now rare in the Glasgow area. Semi-aquatic plants include water whorl-grass (*Catabrosa aquatica*) and water purslane (*Lythrum portula*), both rarely seen now around Glasgow, and bristle sedge (*Isolepis setacea*). Aquatic plants include white waterlily (*Nymphaea alba*) and pondweeds (*Potamogeton* spp.).

Bugs and beetles represent similar habitats and in addition, rotting vegetation and dung; there were also stack-dwelling insects. Dr R. Crowson kindly identified some of the beetles and John Lock, formerly of York University, continued the bug hunting.

Those of you who are familiar with the semi-natural vegetation between Milngavie and Mugdock will know that similar habitats still exist and most of the plants still grow in the area. So we may assume that the pre-urban landscape to the north of Glasgow was well established by at least 2000 years ago.

You may be wondering how the native tribes were living at this time. What food did they eat? Were they good farmers? To find out we turn to evidence from middens in brochs and crannogs. In 1906 a crannog in the River Clyde at Old Kilpatrick was excavated. Crannogs were probably places of refuge and were in use from the Bronze Age to the 17th century. Massive timbers were often used in the construction of flooring and dwellings on crannogs but all that now remains of the plant material collected from the Old Kilpatrick crannog is some charcoal with cereal grains and other seeds, a fragment of hazel wattle and part of an artefact of alder wood. The charcoal is of alder, wood which can withstand wet conditions, some was radiocarbon dated and yielded an early Iron Age date of before 400 B.C. There were remarkably well-preserved

cereal ears which showed that the ears had not been threshed before taking them to the crannog. The cereals are of hulled six-row barley (*Hordeum vulgare*) which is the barley grown throughout prehistory in Scotland and known as bere barley. There was also emmer wheat (*Triticum dicoccum*) a primitive wheat no longer grown in Britain. Then, as now, wheat was only grown in climatically favourable places in Scotland such as the coastal fringes and the more sunny eastern parts. It is of interest that wild oats (*Avena fatua*) was already a problem as it still is at the present time.

Bramble and raspberry pips (both pl.1), achenes of dog rose (*Rosa canina*), two fruit-stones of sloe (*Prunus spinosa*) and a collection of bird-cherry (*Prunus padus*) fruit-stones were all found, presumably all from local sources.

You may be wondering if the natives' diet was also largely vegetarian! This seems unlikely; with suitable conditions for their preservation, broch sites in Scotland have yielded bones, especially cattle bones, as well as burnt barley grains and other plant remains.

If we want comparable evidence of the Iron Age diet to that from Bearsden, we need to go north to Orkney to a most unusual find in a broch well (Bell & Dickson, 1990). It is in fact a very rare find in European prehistory. A number of mineralised human coprolites (fossilized excrement) were found together with bones, shells and pottery in a midden deposit tipped into a broch well. Obviously the well had become disused and was used as a rubbish tip. Calcareous water had percolated through and so preserved them; fortunately they readily broke down in dilute acid. There was surprisingly little organic material remaining after decalcification. It consisted of a few plant fragments, animal hairs, rare cancellus bone fragments, tiny feather fragments, insect remains and pollen grains.

There were fragments of seeds of arable weeds and heath and bog plants were represented. The only food plants found were rare fragments of barley bran and linseed, both seed and capsule fragments. The barley bran was very poorly preserved, not because of mineralisation but, as experimental cooking showed, it seemed to result from the way the grain had been cooked. If you bake barley flour in bannocks, the cells of the bran coats are not greatly altered but if the barley is pearled and cooked for three to four hours as in barley broth, the bran coats are much degraded as was the case

in these coprolites. It seems then that barley broth had been consumed.

The animal hairs were examined by Mr H. M. Appleby, a textile consultant, and by examining the scale pattern of the cortex and the type of medulla, with a microscope, he was able to identify some of the hairs as those of deer and sheep or goat. Hairs, too degraded to identify, could be the thicker hairs of cattle and pigs. The bones in the midden were of red deer, cattle, sheep and pig with rare cod bones and limpet shells. Cattle bone gave a radiocarbon date of between 210 and 430 A.D.

The insect remains were kindly identified by Dr R. M. Dobson and we concluded that some of them could have been introduced with none too clean drinking water.

Pollen, presumably from drinking water, including the broth and perhaps barley ale, indicated an almost treeless landscape with grassy heath, pasture and traces of arable weeds. This is similar to surface samples analysed by Dr Terry Keatinge and suggests broadly similar land use in the Orkney Iron Age to that at the present time.

What can we conclude from this brief survey? Somewhat surprisingly it seems that the outstanding changes to the vegetation of the central valley of Scotland had already been made before the Romans invaded. Generations of Iron Age pastoralists had created the turf which the Romans used to good effect to build the Antonine Wall and the fort ramparts. It seems that the Roman soldiers enjoyed a well-balanced possibly largely vegetarian diet with wholemeal bread, perhaps flavoured with imported spices. Apparently both Roman and native took advantage of local seasonal fruit; but the diet of the native tribes was not necessarily the same in the northern isles as in the Clyde estuary. But how typical was the seemingly plant-based food of the Clyde crannog and the meat with barley broth from Orkney? We need more evidence; some native latrines would help! However, I would prefer a few Iron Age bog bodies with intact gut contents such as the celebrated Lindow Man from Cheshire. Whatever the source of dietary evidence, we can be certain that the light microscope will be invaluable for the basic identifications of plant and animal remains for many years to come.

Acknowledgments

I am grateful to Miss H. Adamson, Art Gallery and Museum, Glasgow, for permission to include unpublished identifications from the Old Kilpatrick crannog. Dr C. D. Pigott kindly gave permission to reproduce Figure 1. The photographs in Plate 1 are by Norman Tait.

References

- BELL, B. and DICKSON, C. 1989. Excavations at Warebeth (Stromness cemetery) broch, Orkney. *Proc. Soc. Ant. Scot.* 119.
- DICKSON, C. 1989. The Roman army diet in Britain and Germany. *Archäobotanik, Dissertat. Botanic.* 133: 135-154.
- DICKSON, C. A. and DICKSON, J. H. Forthcoming. The Plant Remains in BREEZE, D. J. *The Roman Fort at Bearsden*: Edinburgh.
- KNIGHTS, B. A., DICKSON, C. A. and J. H., and BREEZE, D. J. 1983. Evidence concerning the Roman Military Diet at Bearsden, Scotland, in the 2nd century A.D. *J. Archaeol. Sci.* 10: 139-152.

ERRATUM: Vol. 21 part 5, 1990

Since publication of "A check-list of the freshwater invertebrate fauna of the Loch Lomond catchment" (*Glasg. Nat.* (1990) 21: 537-554) a number of errors have come to light. Copies of this list should be adjusted as follows: the coleoptera, *Hydaticus transversalis* (Pontoppidan) and *Copelatus haemorrhoidalis* (Fabricius) should be removed from the list, as should *Coelambus nigrolineatus* as it is synonymous with *Coelambus novemlineatus* (Stephens). In addition it has been pointed out that the records of *Limnebius papposus* Mulsant, *Helophorus dorsalis* (Marsham) and *Haliphus variegatus* Sturm, obtained from the literature are dubious given the current known U.K. distribution of these species. Thanks are due to Dr G. N. Foster for his help in tracking down these mistakes.

Insect Records from the West of Scotland in 1989

Compiled by I. C. CHRISTIE

Gartlea, Caldarvan, by Alexandria.

1989 was remarkable for steadily improving weather conditions. After three mild and very wet months, April heralded a change to a much drier period, and from then onwards warm spells increased in length and frequency until the whole of July and the first week of August were largely fair. The remainder of August was wet but most of September, early October, November and December were exceptionally dry. Overall, this produced an unusually favourable season in the West of Scotland, building up the populations of many insects.

In this list of records, specific names and reference numbers of Lepidoptera are as in Bradley, J. D. and Fletcher, D. S., 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*. Curwen Books, London. As entries are numbered family names have been omitted. Other insects are as in Kloet, G. S. and Hincks, W. D., 1964 (Small Orders and Hemiptera), 1976 (Diptera and Siphonaptera), 1977 (Coleoptera and Strepsiptera) and 1978 (Hymenoptera), *A Check List of British Insects*, Edn.2.

ORTHOPTERA

TETRIGIDAE

Tetrix undulata (Sowerby), Milton Lockhart, V.C.77, 10/6/89, EGH.

LEPIDOPTERA

15. *Hepialus sylvina* (L.), Orange Swift, Coille Mhor, Isle of Colonsay, V.C.102, 9/8/89, ICC.

74. *Stigmella assimilella* Zell., Rowardennan, Loch Lomond, V.C.86, 1/9/89, larval mines in aspen, JRL.

104. *S. magdalenae* (Klim.), Rowardennan and Balmaha, Loch Lomond, V.C.86, 2/9/89, larval mines in rowan, JRL.

119. *Opostega salaciella* (Treit.), Carsaig, Isle of Mull, V.C.103, 10/6/89, ICC.

121. *O. crepusculella* Zell., Carsaig, Isle of Mull, V.C.103, 11/6/89, ICC.

Glasg. Nat. 22 part 1 (1991)

138. *Lampronia fuscata* (Tengst.), Gartrenich Moss, Buchlyvie, V.C.86 and Gartlea, Loch Lomond, V.C.99, 23/4/89, several larval galls at each site, all parasitized, KPB.
163. *Adscita staites* (L.), The Forester, Ballachuan, Isle of Seil, V.C.98, 23/6/89, four, ICC.
169. *Zygaena filipendulae* (L.), Six-spot Burnet, Strathclyde Country Park, Motherwell, V.C.77, colony in 1989, TNT.
199. *Psychoides verhuella* Bruand, Easdale, Isle of Seil, V.C.98, 12/10/89, many larvae on *Asplenium trichomanes* and *A. ruta-muraria*, ICC.
260. *Leucoptera scitella* (Zell.), Balmaha, Loch Lomond, V.C.86, 2/9/89, larval mines in crab-apple leaves, JRL.
274. *Bucculatrix ulmella* Zell., Balmaha, Loch Lomond, V.C.86, 2/9/89, mines and larvae on oak leaves, JRL.
292. *Caloptilia leucapennella* (Steph.) form *aurantiella* Peyerimhoff, Ross Wood, Rowardennan, Loch Lomond, V.C.86, 2/9/89, KPB.
332. *Phyllonorycter corylifoliella* (Hub.), Flanders Moss, Thornhill, V.C.87, 3/9/89, mines in birch, JRL.
338. *P. cavella* (Zell.), Flanders Moss, Thornhill, V.C.87, 3/9/89, mines in birch, JRL.
347. *P. anderidae* Fletcher, Flanders Moss, Thornhill, V.C.87, 3/9/89, MRY.
360. *P. kleemannella* (Fab.), Rowardennan, Loch Lomond, V.C.86, 2/9/89, mines in alder, JRL.
392. *Glyphipterix schoenicolella* Boyd, Isle of Oronsay, V.C.102, 7/8/89, ICC.
394. *G. forsterella* (Fab.), Ballachuan, Isle of Seil, V.C.98, 30/5/89, ICC.
422. *Argyresthia albitristia* (Haw.), Kiloran Bay, Isle of Colonsay, V.C.102, 6/8/89, several, ICC.
440. *Paraswammerdamia spiniella* (Hub.), Kiloran Bay, Isle of Colonsay, V.C.102, 6/8/89, several, ICC.
452. *Ypsolopha nemorella* (L.), Colonsay House garden, V.C.102, 4 and 8/8/89, two, ICC.
496. *Coleophora milvipennis* Zell., Flanders Moss, Thornhill, V.C.87, 3/9/89, larvae on birch, JRL.
628. *Biselachista eleochariella* Stt., Kinloch, Isle of Rhum, V.C.104, May/June 1989, the late Mike Nelson per ICC; Camas Tuath, Ross of Mull, V.C.103, 12/6/89, ICC; Ballachuan, Isle of Seil, V.C.98, 23/6/89, ICC.
794. *Lita virgella* (Thun.), Flanders Moss, Thornhill, V.C.87, 27/5/89 and 3/6/89, two, ICC.
817. *Scrobipalpa clintoni* Pov., The Strand, Isle of Oronsay, V.C.102, 7/8/89, larvae in *Rumex crispus*, ICC.
822. *S. acuminatella* (Sirc.), Carsaig, Isle of Mull, V.C.103, 14/6/89, ICC.
898. *Limnaecia phragmitella* Stt., Gartlea, Loch Lomond, V.C.99, 10/8/89, ICC.
924. *Hysterothraupis maculosana* (Haw.), Carsaig, Isle of Mull, V.C.103, 10 to 15/6/89, several, ICC.
947. *Aethes smeathmanniana* (Fab.), Gartlea, Loch Lomond, V.C.99, 20/7/89, ICC.
1002. *Lozotaenia forsterana* (Fab.), Kilmory, Isle of Rhum, V.C.104, 9/7/89, the late Mike Nelson, per ICC.
1006. *Epagoge grotiana* (Fab.), Gartlea, Loch Lomond, V.C.99, 20/7/89, ICC; Aber Bog, Loch Lomond, V.C.99, 10/7/79 (*sic*), ICC.

1071. *Olethreutes arbutella* (L.), Camas Tuath, Ross of Mull, V.C.103, 12/6/89, pupae on bearberry, emerged late June, ICC.
1106. *Lobesia reliquana* (Hub.), Ariundle, Strontian, V.C.97, 12/6/89, several, MRY; Glasdrum, Loch Creran, V.C.98, 9/6/90, ICC.
1120. *Ancylis mitterbacheriana* (D.&S.), Rowardennan and Balmaha, Loch Lomond, V.C.86, 2/9/89, larvae on oak, JRL.
1141. *Epinotia nemorivaga* (Tengst.), Garvard and Loch Cholla, Isle of Colonsay, V.C.102, 8 and 11/8/89, larvae in bearberry leaves, ICC.
1162. *Griselda myrtillana* (H.&W.), Flanders Moss, Thornhill, V.C.87, 27/5/89, several, ICC.
1212. *Rhyacionia pinivorana* (L.&Z.), Carsaig, Isle of Mull, V.C.103, 12/6/89, ICC.
1381. *Anania funebris* (Strom.), Glasdrum, Loch Creran, V.C.98, 30/5/89, MRY.
1524. *Emmelina monodactyla* (L.), Carsaig, Isle of Mull, V.C.103, 11/6/89, ICC.
1545. *Colias croceus* (Geoff.), Clouded Yellow, six sightings of at least four insects at Rockcliffe, Dumfries & Galloway, 26/7/89, NR.
1546. *Gonepteryx rhamni* (L.), Brimstone, Kilmartin, Lochgilphead, V.C.98, 6/8/89, one male, Rev. A. D. Jones per PW.
1553. *Anthocharis cardamines* (L.), Orange-tip, Drumpellier Country Park, Coatbridge, V.C.77, 6/5/89, FMCC; Cander Moss, Stonehouse, V.C.77, 20/5/89, RS; Possil Marsh, Glasgow, V.C.77, 21/5/89, EGH; Chapelton, V.C.77, 21/5/89, EGH; Witchmoss Wood, Bridge of Weir, V.C.76, 22/5/89, PT; Barrhead Railway, V.C.76, 23/5/89, JEM; Drumclog Muir, Mugdock, V.C.86, (eggs), 26/5/89, RS; Bearsden, V.C.86, (egg) 28/5/89, RS; Castle Semple Country Park, Lochwinnoch, V.C.76, 30/5/89, KMcG; Kelvingrove Park, Glasgow, V.C.77, 7/6/89, RS; Gateside Dam, V.C.76, 8/6/89, JEM.
1590. *Vanessa atalanta* (L.), Red Admiral, many records: earliest, David Marshall Lodge, Aberfoyle, V.C.87, 15/4/89, EGH; latest, Cander Moss, V.C.77, 24/10/89, RS.
1591. *Cynthia cardui* (L.), Painted Lady, Castle Semple Country Park, V.C.76, 16/6/89, KMcG; Gales, V.C.75, 26/7/89, JPB; Paisley Moss, V.C.76, 25/8/89, JEM; Brae, Dunlop, V.C.75, 8/9/89, ERW; Bearsden, V.C.99 2-16/9/89, RS.
1621. *Hipparchia semele* (L.), The Grayling, Rockcliffe, Dumfries & Galloway, V.C.73, 22/6/89 (very early date), JPB; Dalmarnock, Glasgow, V.C.77, 19/7/89, TNT.
1693. *Scopula floslactata* (Haw.), Cream Wave, Carsaig, Isle of Mull, V.C.103, 11/6/89, ICC.
1893. *Semiothisa liturata* (Cl.), Tawny-barred Angle, Carsaig, Isle of Mull, V.C.103, 12/6/89, ICC.
2017. *Clostera pigra* (Huf.), Small Chocolate-tip, Isle of Oronsay, V.C.102, larvae on *Salix aurita*, ICC.
2069. *Tyria jacobaeae* (L.), Cinnabar, Carsaig, Isle of Mull, V.C.103, 11/6/89, ICC.
2412. *Eustrotia uncula* (Cl.), Silver Hook, Ballachuan, Isle of Seil, V.C.98, one on 30/5/89 and many on 23/6/89, ICC.

COLEOPTERA

CERAMBYCIDAE

- Strangalia maculata* (Poda), Mingary, Ardnamurchan, V.C.97, 6/7/89, five flying in sunshine, ICC.

CURCULIONIDAE

Pentarthrum huttoni Wollaston, Port Bannatyne, Isle of Bute, V.C.100, Sept. '89, EGH.

DIPTERA

TIPULIDAE (Crane flies)

Tipula grisescens Zett., near Aberfoyle, V.C.87, 16/4/89, EGH.

Antocha vitripennis (Meigen), Milton Lockhart, V.C.77, 10/6/89, EGH.

Helius flavus (Walker), Little Cumbrae, V.C.100, 22/6/89, EGH.

Dactylolabis transversa (Meigen), Upper Nethan Gorge, V.C.77, 10/6/89, EGH.

Lipsothrix errans (Walker), Fiddler's Glen, V.C.77, 10/6/89, EGH.

Molophilus pusillus Edwards, Conic Hill, Balmaha, Loch Lomond, V.C.86, 4/9/89, EGH.

CERATOPOGONIDAE (Biting midges)

Culicoides nubeculosus (Meigen), near Cander Moss, Stonehouse, V.C.77, 20/5/89, EGH.

ANISOPODIDAE

Sylvicola fenestralis (Scopoli), Chatelherault, Hamilton, V.C.77, 11/6/89, EGH.

Mycetobia pallipes Meigen, Chatelherault, Lanarks., V.C.77, 11/6/89, EGH.

BIBIONIDAE

Dilophus febrilis (Linnaeus), (Fever Fly), in garden, Airdrie, V.C.77, 12/10/89, MJC.

DOLICHOPODIDAE

Syntormon aulicus (Meigen), Balmaha, Loch Lomond, V.C.86, 3/9/89, EGH.

EPHYDRIDAE

Ochthera mantis (De Geer), Arnprior, V.C.86, 4/9/89, GER and EGH.

HYMENOPTERA

APIDAE

Psithyrus campestris (Panzer), s. *swynnertoni* Richards, Kiloran Bay, Isle of Colonsay, V.C.102, 11/8/89, three drones, ICC.

Contributors

J.P. Black (JPB), Dr K.P. Bland (KPB), I.C. Christie (ICC), Dr M.J. Colloff (MJC), E.G. Hancock (EGH), Dr J.R. Langmaid and other participants in the Scottish Entomologists' Meeting, 1989 (JRL), F. McCann (FMCC), K. McGinial (KMcG), J.E. Morgan (JEM), N. Rankin (NR), Dr G.E. Rotheray (GER), R. Sutcliffe (RS), P. Tait (PT), T.N. Tait (TNT), E.R. Watson (ERW), P. Wormell (PW), Dr M.R. Young (MRY).

(Editor's note: future contributions should be sent to Mr E. G. Hancock, Museum & Art Gallery, Kelvingrove, Glasgow G3 8AG. The Society is grateful to Mr I. C. Christie for initiating this series and for collecting records during the past six years.)

The Five Kingdoms Database — A Practical Guide to the Biological Nomenclature of the World of Organisms

ROGER S.LI. GRIFFITH

In this ongoing production, Roger Griffith, Principal Teacher of Biology at Ardrossan Academy, and a member of the Glasgow Natural History Society, has brought together the Scientific and accepted Common Names of some 5000 species of British and non-British organisms distributed throughout the five recognized classificatory Kingdoms, the Prokaryotae (Bacteria, etc.), the Protoctists (Algae, Protozoa, etc.), the Fungi, the Plantae (Plants) and the Animalia (Animals). He has also included disease organisms such as Prions and Viruses which do not fit into the above categories.

Major classificatory groups are considered separately and organisms are listed by their Scientific and Common names with alternatives for the latter where appropriate. There are also separate lists for House Plants, Garden Plants, Food Plants and Galls. An extensive bibliography is appended.

The compilation of such a guide is a Herculean and almost limitless task and the work has already been updated five times since its first appearance in February 1990. At present it is available on 3 inch floppy discs to run on the Amstrad PCW range of computers and there is also a "Hardcopy", i.e. printed version. A copy of the latter, revised and amended to November 1990, has been lodged in the Society's library, within the Mitchell Library, and is available to members.

Mr Griffith extends an invitation to readers to contribute to this most worthwhile and unique compilation by notifying him of any omissions or errors and he would also welcome constructive criticisms on format. Publication in permanent form is hoped for in the near future but, in the meantime, anyone wishing to obtain a copy of a pre-publication issue should contact him at:

The Biology Department, Ardrossan Academy,
Sorbie Road, Ardrossan KA11 8AR.

RONALD M. DOBSON

Short Notes

Compiled by A. McG. STIRLING

Zoological

A juvenile Loggerhead Turtle from Canna

G. N. SWINNEY* and
GRACE M. YOXON +

The Loggerhead Turtle, *Caretta caretta* (Linnaeus, 1758), is a widely distributed marine species. The Atlantic populations nest on beaches of the Mediterranean, the Atlantic coast of Africa and the east coast of the Americas from Maryland south to Uruguay (Pritchard, P.C.H. 1979. *Encyclopedia of Turtles*. Hong Kong). However it is often found far outside its breeding range, and in the eastern Atlantic has been reported as far north as Murmansk. It is the most common Turtle in British waters and there are several Scottish records (Brongersma, L.D. 1972. *European Atlantic Turtles. Zoologische Verhandlungen* 121). Many are for the winter months when it is presumed that the turtles succumb to rapidly falling sea temperatures. Most north-eastern Atlantic records are of juveniles or sub-adults, like the present specimen. The carapace, measured between verticals drawn from the most anterior extremity and the apex of the v-shaped notch between the posterior marginal scutes, is 152mm long.

The specimen was found stranded on the north-east shore of Canna Harbour, Isle of Canna, Inner Hebrides, by Mr Alex MacLellan on 28 February 1990. It had been dead for some time and several of the scutes had begun to lift from the carapace. The specimen has been registered in the collections of the National Museums of Scotland as NMSZ 1990.043. We are grateful to the staff and pupils of Canna Primary School for drawing our attention to the discovery and for kindly donating it to the national collections.

*Royal Museum of Scotland
Chambers Street
EDINBURGH EH1 1JF

+ Skye Environmental Centre
BROADFORD
Isle of Skye IV49 9AQ

**Cornish Sucker Fish at Ailsa Craig,
Ayrshire**

R. HEARSHAW

On 11 August 1990, at Foreland Point, Ailsa Craig, Ayrshire (V.C.75), fifteen specimens of the Cornish Sucker Fish, *Lepadogaster lepadogaster* Bonaterre 1788, were discovered under granite boulders on the foreshore at low water. Individuals ranged in length from 40mm to 74mm (mean 64.6mm) and in weight from 2.5gms to 6.0gms (mean 4.2gms).

The specimens were easily caught by hand, mainly under boulders underlain by coarser pebbles. Where boulders were underlain by larger rocks the fish were not so easily seen, possibly remaining hidden in the interstitial spaces. In this habitat the Cornish Sucker was the most common fish species, the only other being three specimens of the Shanny *Blennius pholis* Linn.

Surprisingly, T.B. Bagenal in the *Fauna of the Clyde Sea Area* — *Fishes* (1965), gives only one record of this species dating from circa 1880. The Clyde area appears to be at the northernmost part of the species' range.

Some specimens were preserved in alcohol and presented to the Natural History Department of the Kelvingrove Museum (Accession Number Z1990-32). (*Compiler's note* This species is sometimes called the Shore Cling Fish — T.B. Bagenal, *The Observer's Book of Sea Fishes* 1972).

**Increase in numbers of breeding Greylag Geese,
Anser anser (L.), in the Muck Islands** RUTH H. DOBSON

In 1986 Dobson & Dobson reported three proved and four possibly breeding pairs of Greylags throughout the Muck Islands, Inner Hebrides (*Glasg. Nat.* 21, 183-199).

On a visit to Horse Island on 27 May 1987 seven pairs with downy young were seen on the sea close to the shore and two attended nests with eggs, proving at least nine breeding pairs. As there is no evidence of this number nesting in Horse Island and few geese were found in Muck in that week these families probably moved there from their nest sites scattered throughout Muck.

In April and May 1988 four nests, five probably breeding and two possibly breeding pairs were found. This is a conservative estimate as it was not possible to cover the whole of the islands.

Common Crossbills feeding in gardens

J. MITCHELL

Although the Common Crossbill *Loxia curvirostra* L. has been established as a breeding species in Garadhbhan Forest just to the south-east of Loch Lomond since at least 1977 (*Clyde Area Bird Report* No. 5, 19), it was only in the autumn of 1990 that I noted small numbers of crossbills feeding in nearby gardens for the first time. Observations made at Drymen between late August and the end of September showed that the birds not only foraged for conifer seeds, but also for invertebrates in deciduous trees.

These opportunist crossbills may not have been local individuals however, for the sightings followed widespread reports of an influx of continental birds into Scotland during the summer, recalling a previous irruption into Loch Lomondside recorded in 1927. Throughout August and early September of that year exceptionally large flocks of Common Crossbills passed through the region and included the occasional visit to gardens. (*Scott. Nat.*, 1927, pp. 158-159).

Pill Millipede on Arran

E. GEOFFREY HANCOCK

During the Glasgow Naturalists' weekend field meeting to Arran several examples of the Pill Millipede, *Glomeris marginata* (Villers), were found on 2 June 1990 in a small wooded stream valley near the Machrie Water (NR930335). During our time on the island I had been searching for woodlice in each of the 10km squares we passed through. The initial hope had been to discover a population of the Pill Woodlouse which is found in lime-rich situations. At this particular site such a possibility derived from the volcanic rocks outcropping nearby. The superficial physical appearance of these two invertebrates extends to sharing a preference for similar habitats.

Old records for the Pill Millipede up to 1901 include West Kilbride, Kilwinning and Brodick (Elliot, et al. *Fauna, Flora and*

Geology of the Clyde Area, British Association, Glasgow 1901). Bagnall (1913, *Glasg. Nat.* 5, 92) contributed a number of records of myriapods, mostly resulting from a holiday in Rothesay with a day on Arran. He refers to a colour variety seen at Ormidale but while noting *Glomeris* as occurring in many Clyde localities does not specify whether he too had seen it on Arran.

The latest distribution map showing known localities resulting from the work of the British Myriapod Group has three dots for the Clyde area in Renfrewshire and Stirlingshire (*Preliminary Atlas of the Millipedes of the British Isles*, Biological Records Centre, Monks Wood 1988). Presumably this interesting little invertebrate is fairly widespread if looked for in the right situations.

The Water Bug *Aphelocheirus aestivalis* in the River Doon

C. R. DOUGHTY

The aquatic bug *A. aestivalis* (Fabricius) is typically found in stony rivers in southern Britain. It occurs very locally in Scotland, with recent records from the Solway Dee, the River Cree near Newton Stewart and the Black Cart Water, Renfrewshire (*Glasg. Nat.* 21, 114). Since 1986, single specimens have been found in the River Doon below Patna, Ayrshire (NS412126) on four occasions by Clyde River Purification Board biologists. In April 1990, however, specimens were also taken from the Doon at Waterside (NS444079) and Dalrymple (NS353140). The species now appears to be well established in the river. It is interesting to speculate on the origin of *A. aestivalis* in the Doon. Water from the Water of Deugh, an upper tributary of the Dee system, is transferred to the Doon catchment as part of the Galloway hydro-electric scheme. It is possible that *A. aestivalis* colonised the River Doon by this route.

Re-discovery of the mayfly *Brachycercus harrisella* in the River Clyde

C. R. DOUGHTY

Nymphs of the mayfly *B. harrisella* Curtis inhabit silted areas of rivers. The species has a very local distribution in Britain. In 1954, specimens were taken from the River Clyde at Hyndford Bridge by Dr T. T. Macan and there were further records from the Biggar-

Lanark stretch of the river during the early 1970s (Clyde River Purification Board, unpublished data). However, until this year it had not been seen in the Clyde for at least 15 years. In June 1990, several specimens were collected from the Clyde at Carstairs Junction (NS956446) by Clyde RPB biologists. It is probable that *B. harrisella* was present in the Clyde during the intervening period, but owing to its preference for silted areas, was not collected. Before 1975, Clyde RPB biologists collected invertebrates from silty pools as well as stony riffles. Since then, only riffles have been sampled. In 1990, however, sampling included both types of habitat. The River Clyde remains the only locality for this species in the west of Scotland.

Scottish records of some Dolichopodid flies

E. GEOFFREY HANCOCK

As a result of Iain MacGowan's report *A preliminary survey of Dolichopodidae (Diptera) in Scotland* by the Nature Conservancy Council (1988), other observations can be put into context. They can be integrated with the information now available in order to identify the species which are generally rare (rather than just under-recorded) and may be in need of further study to understand their habitat and hence conservation requirements. The following are those examples of the genus *Dolichopus* which I have collected but only recently identified. The species mentioned are only those categorised as uncommon or of greater rarity in the above report.

<i>D. caligatus</i> Wahlberg	South Uist, Howbeg, (V.C.110), 8 July 1988 (on machair).
<i>D. claviger</i> (Stannius)	Inverness, Coylumbridge, (V.C.96), 14 June 1986.
<i>D. latelimbatus</i> Macquart	Dumfries, Caerlaverock, (V.C.72), 12 June 1987.
<i>D. picipes</i> Meigen	Little Cumbrae, (V.C.100), 22 June 1989.
	Nairn, Ord, (V.C.96), 10 June 1983.

D. caligatus is now recorded from six sites in the Outer Hebrides although this is the first from outside Lewis. *D. latelimbatus* was only known from southern England before MacGowan's work. It has now been seen in five places in central and southern Scotland.

Re-discovery of the beetle *Laemostenus complanatus* at Leith

D. HORSFIELD

On 11 October 1987 I found two individuals of *Laemostenus*

complanatus (Dejean) (Coleoptera, Carabidae), a medium-sized brown ground-beetle, under stones on waste ground by the coast at Leith Docks near Edinburgh, V.C.83 (NT285763). Dr M. L. Luff of Newcastle-upon-Tyne University who runs the Carabid recording scheme confirmed my identification and tells me that these are the first Scottish specimens that he has seen. I subsequently discovered that my find at Leith was a re-discovery since there is a record by D. K. Kevan (1936, *Scott. Nat.* 1936: 59) of this species, from a timber yard at Leith Docks, taken on 7 October 1935. The specimen is in Kevan's collection at the Royal Museum of Scotland in Edinburgh where I was recently able to examine it.

There are only three other published records for this species in Scotland. A. Ferguson (1913, *Scott. Nat.* 1913: 160) gives records for Dumfries and Wigtown, while P. Wormell (1982, *Biol. J. Linn. Soc.*, 18: 291-401) records one example from a barn at Kinloch, Isle of Rhum, taken in 1962.

Originating from North Africa *Laemostenus complanatus* has been dispersed by trade to ports in most continents (Lindroth, 1974, Coleoptera: Carabidae, *Handbk Ident. Br. Insects*, 4: 1-148). It was first recorded from the British Isles in the early years of this century from a number of localities in southern England and Ireland (Fowler & Donisthorpe, 1913, *The Coleoptera of the British Islands*, VI. Reeve, London).

I am grateful to Dr Mark Shaw and to Dr Graham Rotheray of the Royal Museum of Scotland, Edinburgh for access to the Scottish Insects Record Index. One specimen is deposited in the collection at the Royal Museum of Scotland.

Two Beetles (Coleoptera: Staphylinidae) from Islay (V.C.102)

M. SINCLAIR

As a result of examining the beetles from a pitfall-trapping programme at Kilchoman, Islay, 1980-1, I was able to add a few species to the fauna of the island (1988, *Glasg. Nat.*, 21:493-4). Recently, from the same source, I received a further, small series of beetles that had been overlooked earlier, and this included two species that do not seem to have been recorded in Islay.

A single *Tachinus corticinus* Gravenhorst male was found. Welch, in a compilation of beetle species lists from various Inner Hebridean islands, did not include this species from any of them (1983, *Proc. Roy. Soc. Edinb.*, 83B:505-529). There were also several specimens of *T. pallipes* (Grav.) which Welch (*loc. cit.*) noted from Rum and Canna but not from Islay. *T. corticinus* is widespread and common. *T. pallipes* is also widely distributed but rather more local.

Girnigeo, Main Street, Denholm, Roxburghshire, TD9 8NU

Botanical

Lochan Iliter, Isle of Luing

B. H. THOMPSON

The first of only three V.C.98 (Main Argyll) records for the Nodding Bur-Marigold (*Bidens cernua*) was made in 1968 by A. A. P. Slack at Lochan Iliter (*Watsonia* 8, 307). To establish if *Bidens* still grew there I briefly visited the lochan on 16 September 1990. Not only was *Bidens* still growing there in considerable abundance but this small lochan has a rich assemblage of plant species which equals in interest that described from another small lochan, Ardtur Pond, Appin (*Glasg. Nat.* 21, 353) and certainly warrants further investigation.

Lochan Iliter is in fact a reservoir and still Luing's water supply. Little, if any, maintenance can have been done for many years as the south end has developed into an inaccessible swamp where *Ranunculus lingua*, new to V.C.98, was growing quite plentifully. It seems most unlikely that this has been deliberately introduced and it is worth noting that it was also found on Tiree during June 1990 — a new record for V.C.103.

Other plants of interest noted at Lochan Iliter were *Nuphar lutea* (plentiful), *Lythrum portula*, *Potamogeton alpinus* and *P. obtusifolius*. It is to be hoped that any maintenance work at the reservoir is staged and not done as a single dredging operation which would destroy much, if not all, of the botanical interest.

Stag's-Horn Clubmoss at Ruchill, Glasgow — Postscript

N. R. GRIST

Discovery of Stag's-Horn Clubmoss (*Lycopodium clavatum*) and associated moorland flora in a patch of grass at Ruchill Hospital,

Glasgow, V.C.77, was reported in this journal (Grist, N. R. & Macpherson, P. 1988: *Glas. Nat.* 21, 481) and demonstrated to GNHS Members' Slide Show in 1989. This was one of five colonies, two of recent origin (five years or less) found during the *Flora of Glasgow* project (J. H. Dickson, pers.comm. and in prep.)

During 1989 the Ruchill clubmoss was noticed to be withering and by 1990 had disappeared although accompanying heather and bilberry were still present. At the same time the colony at Glasgow Necropolis also withered and died (J. H. Dickson, pers.comm.). The early summer of 1989 was unusually but not uniquely hot and dry. An additional adverse factor affecting the Ruchill colony was well-meaning application, without my knowledge, of calcium- and potassium-rich fertiliser, inappropriate for a plant requiring impoverished, acid soil.

Perhaps populations of the clubmoss have a tenuous, unstable hold in this marginally unsuitable territory, readily suppressed by adverse circumstances, yet able to establish new colonies from wind-dispersed spores where local conditions are suitable. I am informed that the patch of grass at Ruchill where the clubmoss was found has long been known to the gardeners as a sour, damp area, and so may have provided favourable conditions for colonisation by the clubmoss and likewise the other moorland plants associated with it.

Additions to the list of Vascular Plants for the Mucks Islands (V.C.104)

RUTH H. DOBSON

The following records are additional to the list given by Dobson & Dobson 1985 (*Glas. Nat.* 21, 13-18).

<i>Lotus uliginosus</i> (Large Birdsfoot-trefoil)	Wet grass on Horse Island. Uncommon.
<i>Epilobium roseum</i> (Small-flowered Willow-herb)	Old garden at Port Mor.
<i>Circaea lutetiana</i> (Enchanter's Nightshade)	Garden at Port Mor.
<i>Festuca ovina</i> agg. (Sheeps Fescue)	Rough grass. Rare.
<i>Agrostis gigantea</i> (Black Bent)	Beside cultivated fields. Rare.

Persistence for 20 years of Guernsey stowaways in a Glasgow garden

P. MACPHERSON

I have previously reported on the succession of plants which grew from the soil round a wild plant given to me in Guernsey (*Glasg. Nat.* 19, 139; 1974). Some appeared only once, one for two and another for three years, but both Musk Stork's-bill (*Erodium moschatum*) and Four-leaved Allseed (*Polycarpon tetraphyllum*) have persisted without aid for twenty years. The former has spread and appears in cracks in the paving, in the rockery, herbaceous and peat beds. When left to grow, plants have reached 2½ feet in diameter. The Allseed has seeded itself into troughs and pots. Curiously, it appears in the autumn and flowers over the early part of the winter, whereas flowering time in Guernsey is given as May onwards.

Difficulties with the identification of Twiggy Spurges

P. MACPHERSON

A Twiggy Spurge seen by the roadside at Carmyle, V.C.77 was originally identified as *Euphorbia uralensis* (*Glasg. Nat.* 19, 203; 1975) but was subsequently re-determined as *E.x pseudovirgata* (*Glasg. Nat.* 20, 184; 1981). The patch persisted until development of the area took place, but a further site was reported from Govan, also within V.C.77 (*Glasg. Nat.* 21, 352; 1987).

Leaf shapes from the new and original sites had been compared and although tending towards *E. waldsteinii* (*E. virgata*) the literature indicated that this species does not occur in Britain — a statement repeated in *Plant Crib* (Compilers: Rich, T. C. G. & Rich, M. D. B., BSBI, London: p.64; 1988).

The Govan site was re-assessed in 1989 and it was noted that the colony had expanded. Further material was taken and matched even more closely the descriptions of *E. waldsteinii*. The specimens were sent to the referee who made a positive identification of *E. waldsteinii*, adding that the statement in the *Plant Crib* had therefore been proved to be wrong.

I am grateful to Dr Radcliffe-Smith, the *Euphorbia* referee for the definitive identification of my specimens.

Duke of Argyll's Tea-Plants in the West of Scotland

P. MACPHERSON and
A. McG. STIRLING

While returning from the GNHS *Flora of Glasgow* south-east Glasgow field meeting on 27 August 1989 one of the authors (PM) made a detour via Westburn, near Cambuslang (V.C.77). As he drove along he saw an arching plant in a hedge and idly thought that had he been in southern England (especially near the coast) he would have accepted without question that it was a Duke of Argyll's Tea-plant (*Lycium* sp.). Half a mile farther on he asked himself what else it could have been, and on returning found to his surprise that it was indeed *Lycium chinense* in flower.

The name 'Duke of Argyll's Tea-plant' is most usually applied to *L. barbarum* L. (*L. halmifolium* Mill.), a closely related species, indeed some modern authors consider it indistinguishable from *L. chinense*. *L. barbarum* is said to occur more frequently than *L. chinense* and the other author (AMcGS) has recently recorded the former in four places in Ayrshire (V.C.75), all near the coast in light or sandy soils, at Prestwick, Heads of Ayr, Girvan and Ballantrae.

The vernacular name derives from the fact that a *Lycium* and a *Thea* were sent to the London garden of a Duke of Argyll with the labels transposed. *Lycium* thereafter kept the ironic name of Duke of Argyll's Tea-plant (or Tea-tree). The following characters are said to separate the two species:—

In *barbarum* the leaves are widest at the middle; the corolla tube narrowly cylindrical for 2.5-3.0mm at the base, and the stems usually spiny.

In *chinense* the leaves are widest below the middle; the cylindrical part of the corolla tube 1.5mm, and the stems usually unarmed.

A species of *Libertia* new to Britain as a naturalised introduction

ALISON RUTHERFORD

Members of the genus *Libertia* are not very commonly grown in Britain despite the climate of the west being so mild, consequently not many have been found as naturalised escapes. Helensburgh is

an area particularly rich in garden outcasts and in 1989 a large colony of a *Libertia* was found on top of the embankment of the West Highland Railway at the north end of the town. It grew in too much shade to flower, but a portion brought into my garden flowered the following summer and was identified by Brian Matthew of the Royal Botanic Gardens, Kew as cf. *L. elegans* Poepp., closely matching a herbarium specimen of the original late 18th century introduction. The keepers of the National *Libertia* Collection in Devon said that they were given living material of *L. elegans* from Kew in 1987 from a 1967 gathering by Sally Duchess as she passed Victoria, Argentina, towards the Andes. Hopefully the Helensburgh plant can be compared with this and its identity established. There is great confusion over the naming of *Libertia* species, some of which are fairly alike. *L. elegans* is distinct in having longer flower stalks so that the three-petalled florets are less bunched together.

**Further observations on Yellow
wort (*Blackstonia perfoliata*) in
Dunbartonshire**

ALISON RUTHERFORD
and
A. McG. STIRLING

The occurrence of this southern species in its only Scottish locality, albeit as a probable introduction by unknown agency, has previously been reported (Stirling, A. McG. *Glasg. Nat.* 20, 480: 1984) from Colgrain, near Helensburgh, V.C.99. The few individual plants noted on that occasion were considered to represent a casual occurrence and unlikely to form the basis of a permanent population. This appeared to be confirmed by the appearance of only a single plant in the following year (1985). Subsequently the development of the area for commercial purposes seemed to have sealed the fate of the *Blackstonia* at the original site.

It was therefore with considerable surprise and pleasure that one of the authors (AR), in mid-August 1990, discovered the Yellow-wort in considerable quantity at no great distance from the original site, but on the opposite side of the Helensburgh-Glasgow railway line (NS322797). Several hundred plants were scattered over an area of permanently damp, sparsely vegetated ground accompanied by, among other species, *Carex demissa*, *Juncus tenuis*, and various grasses.

In addition, two interesting species were present; *Parentucellia viscosa* (Yellow Bartsia), already long known from the locality, and *Anagallis minima* (Chaffweed). The survival success of the *Blackstonia*, an annual species, is certainly due to its copious production of tiny seeds. If undisturbed this population is likely to increase in size as the area of suitable available habitat is large.

Yellow Star-of-Bethlehem in Ayrshire A. McG. STIRLING

The Yellow Star-of-Bethlehem (*Gagea lutea*), a member of the Liliaceae, is a rather rare plant in Scotland, particularly so in the west and north. It has long been known in the vicinity of Stirling Castle, and also on the bank of the Clyde near Crossford, Lanarkshire.

In Ayrshire, *Gagea lutea* was discovered 'in a wood near Largs' by a local naturalist, John Boyd, about 1940. In mid-April 1944 a party from our Society visited the site under the guidance of Mr Boyd and saw the *Gagea* 'just past flowering' (*Glasg. Nat.* 15, 32: 1945). The exact locality was not described and remains unknown to the present day.

A second record of this attractive spring rarity can now be reported. It was found in 1989 near Kirkmichael, by the River Girvan, V.C.75, by a lady member of the Scottish Wildlife Trust, and this news was passed on to me by Mr D. Counsell of the Ayr office of the Nature Conservancy Council later in the same year. Since there was then little point in looking for such an early-flowering plant, a visit was delayed until the spring of 1990 when, on 21 March, a strong colony was examined and photographed. Over forty flowering stems were counted, growing in sandy alluvial soil in the flood zone of the wooded river bank along with native species which included *Petasites hybridus*, *Allium ursinum*, *Ranunculus auricomus*, *Chrysosplenium oppositifolium* and other woodland species.

Although *Gagea lutea* is regarded as having been introduced in some British localities there appears to be no probability of introduction in this case.

The last Willow in "Willow Water Meadow" Street, Glasgow

AGNES WALKER

The willow shown in the photograph, Fig. 1, has now been cut down. From the picture it looks healthy enough but a closer inspection showed that there was a large hole at the base which appeared to go right into the heart of tree. This tree was only one of the trees taken down in the scheme to improve the gardens in front of Royal Crescent on Sauchiehall Street. Some of the trees in this garden — as in many of the gardens and tree-lined streets in the city — were planted over 100 years ago. Gradual replacement will be necessary as trees become too old or unsafe in order to retain beautiful tree-lined streets for another 100 years.

This tree was rather special. It was one of the trees that were planted in the Gardens of the Royal Botanical Institution of Glasgow which once occupied an eight acre site to the west of Charing Cross at Sandyford (the present Henry Wood Hall occupies part of that site). Nothing is left of the old walled garden or the glass-houses — streets have obliterated all of it — and now this last willow has gone. The planners who are involved in designing and replanting the new garden at Royal Crescent have kept cuttings of this tree.

This Botanic Garden was established in 1817. Thomas Hopkirk — famous for his *Flora Glottiana* published in 1813 — was influential in persuading the City Fathers, wealthy citizens and the University (who donated £2,000 at a time when that was a great deal of money) to create a wonderful garden. The old University Physic Garden on the High Street was poorly situated because the industrial smoke killed all its plants, so this move further west was logical. For the Town Council to undertake such an ambitious project at a time when the city population was only about 140,000 says a lot for Thomas Hopkirk's influence and powers of persuasion. Thomas Hopkirk donated all the plants from his extensive garden at Dalbeth House near Carmyle on the banks of the Clyde. It is said he gave thousands of plants — many exotic and wonderful — to this new Botanic Garden. We have looked at the grounds of the former Dalbeth House and found little to suggest that it was once a beautiful garden but large willows grow along the banks of the river nearby which look similar to the one at Royal Crescent. It seems reasonable to speculate that it too could have come from Hopkirk's garden or from the banks of the Clyde near Dalbeth and we look forward to seeing one of its cuttings established at a suitable



Fig. 1. The last willow in “Willow Water Meadow” Street.

site in the city. It is believed to be the hybrid between *Salix alba*, the White Willow, and *S. fragilis*, the Crack Willow (*S. x rubens* Schrank).

Book Review

The Natural History of Moles

MARTYN L. GORMAN & R. DAVID STONE

Christopher Helm, London, 1990, 138 pages, 20 colour plates, 72 black and white illustrations. Hardback, ISBN 0 7470 1214 8, £14.95.

The Natural History of Moles is the ninth volume of a series produced in association with the Mammal Society. The title and cover might deceive you into thinking that this is just another monograph on the European mole, but no so. The past decade has seen observational research benefit from advances in modern technology such as radio telemetry and infra red cameras. This series attempts to explain the results of such research in an "exciting and readable" form. By including information on related foreign species it also seeks to present familiar mammals in a worldwide context.

What results from such laudable aims is a structured 'pot pourri' of research by the authors and others written in a mixture of popular and scientific modes. We are told for example, that the family Talpidae contains "as queer a set of bedfellows as one could wish to meet" but are soon immersed in the equations of energy costs of pushing soil, harmonic mean transformations and isopleths.

Nevertheless there is much to interest those looking for more than the standard monograph. One soon becomes aware of the difficulties of studying animals you rarely see and also amused by the image of X-raying them digging in dry semolina. Because of these difficulties limited work has been carried out on the European mole and research on related species is included as interesting padding to the main chapters on the energy costs of digging, building fortresses, food and feeding, patterns of activity, territories, life and death and aspects of moles as pests.

Working with moles has obviously endowed the authors with considerable sympathy for the species. This is eloquently expressed in the section on poisoning where a disturbing description of the death of a mole by strychnine is concluded by a simple statement that "There is no reason at all to believe that the sufferings of the poisoned mole are in any way less awful".

An excellent distillation of known research on this group but one for the bookshelf of the seriously interested rather than the holiday reader.

DICK HENDRY

Book Reviews

A Guide to Bats of Britain and Europe

WILFRED SOHOBER and ECKARD GRIMMBERGER:
Consultant Editor: Dr ROBERT E. STEBBINGS
(English Translation), Hamlyn Publishing Group Ltd., 1989,
224 pp., many coloured, black and white photographs and line
drawings. Hardback, ISBN 0 600 5642 4X, £10.95.

Over the last six years there has been an upsurge of interest in bats. This was partially initiated by the protection afforded by the Wildlife and Countryside Act, 1981, and the subsequent proliferation of bat groups. This interest in bats has resulted in a large number of bat books being published in recent years and this guide must be one of the most highly rated.

Although the publication is a translation from the German *Die Fledermause, Europas* (Kosmos – Naturfuhrer, 1987) the translation has been carried out by Worcester Bat Group members Iain and Ingrid Macmillan and edited by Bob Stebbings, the guru of the British Bat scenario.

There is an 80-page introduction to bat biology and conservation followed by information on all European species. The species accounts are illustrated with colour photographs and some line drawings and there is an easy-to-use key to identification which is adequately illustrated with black and white photographs of salient characters.

This is an excellent guide which will be of particular interest to travellers to the continent. (Those wishing to handle or disturb bats should be aware of local legislation).

IAN McCALLUM

The Identification of Flowering Plant Families

P. H. DAVIS and J. CULLEN
Cambridge University Press, 1989, X + 133 pages, 8 text
figures. 3rd edition. Paperback, ISBN 0 521 37707 2, £6.95.

The principal parts of this small book are the keys to the flowering plant families to be found native or cultivated in north temperate regions (pp. 31-72) and terse descriptions of these families (pp. 73-114). The diagrams and half flower drawings in the section on 'Usage of Terms' are very clear and helpful.

This edition differs from the second edition mainly in its adoption of the Engler and Prantl taxonomic system, improvements in the keys and the complete rewriting of the section on 'Further Identification'. The book is intended for botanists, gardeners, landscape architects and students who wish to understand the scientific background to plant identification. For those prepared to make the necessary effort it is a very good book.

J. H. DICKSON

Book Reviews

The Manx Shearwater

MICHAEL BROOKE

T. & A. D. Poyser, London, 1990, 246 pp, drawings, black and white photographs, tables, maps, graphs. Hardback, ISBN 0 85661 057 7, £17.00.

The Manx Shearwater is the first book produced under the Poyser label since falling into the hands of Academic Press. The standards of excellence set previously have been maintained and the future for this type of publication seems assured.

Seabird enthusiasts will find much to enjoy in this book, even if the style of writing seems a bit dry. There are chapters covering distribution, movements, general biology and diseases, the latter perhaps reflecting the author's own particular interests in Manx Shearwaters. The author's work and experience appears restricted to a couple of Welsh colonies, but work from the major British colony of Rhum, carried out by Kate Thompson, is drawn upon to augment the data from Pembrokeshire. There are a few minor errors in distribution, and the vital subjects of diet and taxonomy receive little attention but on the whole these do not detract from what is a very useful contribution towards the understanding of these fascinating birds.

B. ZONFRILLO

Where to Watch Birds in Scotland

MIKE MADDERS & JULIA WELSTEAD

Christopher Helm, London, 1989, 368pp., many drawings, maps. Paperback, ISBN 0 7470 2216 X, £10.95.

About 120 or so sites around Scotland are covered in detail for their bird-watching potential, in this the most current and comprehensive guide of its sort. Roadways, O.S. map references and maps, both general and detailed are reproduced to assist with finding the localities mentioned in the text. After each Region, a summarised list of additional sites within that area is given, more than doubling the number of detailed sites in the main text. Obviously space has limited the inclusion of all good sites but I would have thought the Nightjars of Brodick Castle would have rated a mention, more so than some of the other less reliable sites for seeing birds. Most birdwatchers will find this a very useful book and, at the price, is excellent value for money.

B. ZONFRILLO

Book Reviews

Islands in the Sound, Wildlife in the Hebrides

ALISON JOHNSON

Victor Gollancz, London, 1989, 191pp., black and white illustrations by JOHN BUSBY. Hardback, ISBN 0 575 04640 6, £14.95.

Alison Johnson lives at Scarista in the South of Harris, where she sails, with her husband, in a Drascombe Lugger from the harbour at Leverburgh. The Sound of Harris is treacherous for small boats, with islands and reefs, the waters flowing in strange currents and the weather always uncertain. The author's first hand observations of the birds and mammals of this wild place are interspersed with comments on conservation, local history, human behaviour to animals, scientific animal behaviour studies, folklore and amusing family anecdotes. Throughout the book her delight in the scenery and the animals is obvious and many of the descriptions, such as a November visit to a seal nursery, are fascinating. The sensitive and accurate pencil and wash sketches by John Busby illustrate the text perfectly.

JEAN M. MILLAR

Atlas of the British Flora

F. H. PERRING and S. M. WALTERS (Eds.)

Botanical Society of the British Isles, 1990, 441 pages. Softback, ISBN 0 90115 8194, £23.50.

This is a reprint of the third edition of this popular reference work in a new and more convenient format. The previous editions and reprints consisted of an unwieldy volume weighing over five pounds and having a page size of 13" x 9½". By using photographic reproduction techniques and soft instead of hard covers the page size has been reduced to 9½" x 7" and the weight to under two pounds. Reduction of the maps to nearly half the original size has not been unduly detrimental to their clarity provided the reader has reasonably good eyesight. The transparent overlays provided with previous editions have had to be omitted in this version, but the base maps for these are printed at the end of the volume so that users can produce their own overlays if desired.

The only item additional to the contents of the third edition is an extremely useful section contributed by C. D. Preston listing distribution maps from various sources published between the date of the first edition (1962) and 1989. These are listed alphabetically by species and an accompanying bibliography indicates authors and sources.

Now that difficulties of format, cost and availability have been overcome this new version of the Atlas will be gratefully welcomed by those who, until now, for various reasons have lacked the volume on their book shelves.

ALLAN MCG. STIRLING

Proceedings 1989

The chairman, place* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

*GMK: Glasgow Museum and Art Gallery, Kelvingrove

UGBD: University of Glasgow, Botany Department

- 10 JANUARY.** Dr J. H. Dickson, UGBD, 65.
Mr Duncan I. McEwan: Nature Section of 20th Paisley International Colour Slide Exhibition.
- 14 FEBRUARY.** Dr J. H. Dickson, UGBD, 41. 59th A.G.M. Activities during 1988 were reported. Elections were held and appointments by Council announced (see page 102). Council reported that at the end of 1988 there were 270 members (236 Ordinary, 20 Family, 4 Junior, 2 School and 8 Honorary members). Three Council and two Executive meetings had taken place. There had been 13 indoor meetings; 44 excursions were planned, and those which took place comprised 22 Botanical meetings during this last year of the *Flora of Glasgow* Project, one to the *Glasgow Garden Festival* (to which the Society contributed), 2 Geological, 3 Ornithological, 2 Photographic and 6 Zoological excursions. The A.G.M. was followed by a short film of the Society's Social Evening at Culcreuch Castle and an R.S.P.B. film "Farming with Wildlife". Exhibits: Examples of coleophorid (case-bearing) moth and Clouded Yellow butterfly wings preserved under "Transpaseal" (E. G. Hancock); Information about Clydeside sites to be developed for ice-rink (Miss L. Smith). Dr R. Knill-Jones announced that 647 species of Lepidoptera had been recorded in Glasgow and asked for any further records for possible publication.
- 14 MARCH.** Dr J. H. Dickson, UGBD, 39.
Dr J. H. Dickson: All the best dumps around Glasgow (Presidential Address) — a review of 5 years of the Flora of Glasgow project with special reference to plants of local pit bings.
- 11 APRIL.** Mr R. Sutcliffe, UGBD, 50.
Mr R. Lambie: Nature in Camera.
- 18 APRIL.** Mr T. N. Tait, UGBD, 32.
Mr D. McEwan: Nature's Way.
- 9 MAY.** Dr J. H. Dickson, UGBD, 42.
Mr J. Clarke: Natural History of the Forth and Clyde Canal. Exhibits: Scarab and Goliath beetles (E. G. Hancock); *Senecio webbii* from Gran Cranaria (J. Lyth); Agates & teeth from Culzean shore (Miss M. Lyth); Leaf retention of

birch (*Betula pubescens*) seedling growing in *Sphagnum* (I. C. Christie).
Plant and cake sale.

13 JUNE. Social Evening at Rowardennan Hotel, with dinner, attended by 21 members and friends.

29 SEPTEMBER. GMK, 46 (plus 38 visitors).
Annual Exhibition Meeting, with Cheese and Wine.
Exhibits: Society Display boards (G.N.H.S.); stereoscopic images (N. R. Grist); Flora of Glasgow Herbarium specimens (J. H. Dickson); Bumage Herbarium specimens (P. Macpherson); Fungi (R. Hunter & E. Stewart); Mammalian skulls (K. Cohen); Fossils and rocks from Balnakailly Bay, Bute (R. Sutcliffe); Rock from Cornwall (J. MacKay); Scarab beetles from Kempeller Collection (GMK Natural History Dept.); Minerals (J. Jocelyn); B.R.I.S.C. Exhibition boards on biological recording and habitat mapping (B.R.I.S.C.); British Butterfly Conservation Society display & photographs (R. Sutcliffe); sheaves of corn (I. C. Christie).

10 OCTOBER. Dr J. H. Dickson, GMK, 27.
Mr D. Hendry: The Art of Taxidermy.
Exhibits: Skins and skulls of large mammals; freeze-dried small mammals and birds; casts of reptiles, amphibians and fish; skins of birds.

14 NOVEMBER. Dr J. H. Dickson, UGBD, 34.
Dr I. C. Wilkie: The lichen flora of Glasgow.
Exhibits: Recent Flora of Glasgow specimens; *Festuca vivipara*; *Hieracium pilosella*; *Hirschfeldia incana*.

28 NOVEMBER. Mr E. G. Hancock UGBD, 23.
Mr F. Woodward: Pearl fishing and our natural heritage.

5 DECEMBER. Annual Dinner, Dean Park Hotel, Renfrew, 35.
Dr P. Macpherson: Lapping it up with the Reindeer (illustrated presentation).

Officers and Council SESSION XLXIX 1989

- President:* James H. Dickson, B.Sc., M.A., Ph.D., F.L.S.
- Vice-Presidents:* Richard Sutcliffe, B.Sc., A.M.A.
T. Norman Tait, A.B.I.P.P., F.R.P.S.
Mrs Jean Millar
- Councillors:* E. Geoffrey Hancock, B.Sc., F.M.A.
Allan McG. Stirling
Peter Macpherson, F.R.C.P., F.R.C.R., D.T.C.D., F.L.S.
Miss Lorna J. Smith, G.I.Biol.
Derek Blackburn, B.Sc.
Mrs Lynn Dunachie
Keith R. L. Cohen, B.Sc., G.I.Biol.
Iain C. McCallum
Mrs Edna Stewart, B.Sc.
- General Secretary:* Norman R. Grist, B.Sc., M.B., Ch.B., F.R.C.P., F.R.C.Path.
- Treasurer:* Mrs Elspeth L. S. Lindsay, M.B., Ch.B., F.R.C.R.
- Librarian:* Mrs Ruth H. Dobson, B.Sc. M.Sc.
- Editor:* Ronald M. Dobson, M.A., Ph.D.
- Conveners of Sections:* James H. Dickson (*Botany*)
Richard Sutcliffe (*Geology*)
T. Norman Tait, (*Photography*)
E. Geoffrey Hancock (*Zoology*)
- Auditors:* E. L. Sharp, M.A.
E. T. Watt, B.Sc.
- Trustees:* James H. Dickson
Peter Macpherson
- Assistant Secretaries:* Alison V. Sutcliffe (*Fund-raising and Publicity*)
Miss Lorna J. Smith (*Minutes*)
Richard Sutcliffe (*Membership*)
Mrs L. Dunachie (*Newsletter Editor*)
Mrs A. Craib (*Social*)
- Editorial Board:* The Editor
Allan McG. Stirling
James H. Dickson
Iain C. Wilkie, B.Sc., Ph.D.
- Representatives:* Robin Knill-Jones, M.A., M.B., B.Chir., M.Sc., D.P.H., F.R.C.P., M.F.C.M. (*Scottish Wildlife Trust*)
Mrs Jean Millar (*Glasgow Urban Wildlife Group*)

The Glasgow Naturalist

This publication is included in the abstracted and indexing coverage of the Biosciences Information Service of *Biological Abstracts* and in that of *CABS* (Current Awareness in Biological Sciences).

The following back numbers are available for purchase at the prices shown (plus postage).

Volume II	(1909-10)	Parts 1, 2, 3, 4	} £1.50 each
Volume III	(1910-11)	Parts 1, 2, 3, 4	
Volume IV	(1911-12)	Parts 1, 2, 3, 4	
Volume V	(1912-13)	Parts 1, 2, 3, 4	
Volume VI	(1913-14)	Parts 1, 2, (3 + 4)	} £1.25 each
Volume VII	(1915)	Parts 1, 2, 3, 4	
Volume VIII	(1916-18)	Parts 1, 2, 3, 4, 5, 6	
Volume XIII	(1937-38)	Parts 1, 2	
Volume XIV	(1940-44)	Parts 1, 2, 3	} £1.00 each
Volume XV	(1945-49)	Parts 1*, 2, 3	
Volume XVI	(1951-52)	Parts 1, 2, (3 + 4)	
Volume XVII	(1952-56)	Parts 1, 2†, 3, 4, 5, 6	
Volume XVIII	(1958-71)	Parts 1, 2, 3, 4, 5, 6§, 7	} £1.25 each
		Parts 8, 9	
		Part 10	
		Part 11	
Volume XIX	(1973-79)	Parts 1, 2, 3, 4	£2.00 each
		Part 5	£2.50
		Part 6	£4.00
Volume XX	(1980-84)	Parts 1, 2, 3, 4, 5	£4.00 each
Volume XXI	(1985-86)	Part 1, 2	£4.00
	(1987-90)	Parts 3, 4, 5	£5.00 each

*Part 1 contains (18pp) *The Flora of Easter Dunbartonshire* by J. R. Lee.

†Part 2 contains (18pp) *Additions to the flora of the Clyde Area* by J. R. Lee.

§Part 6 (82pp) is a list of the less common Scottish Basidiomycetes by D. A. Reid and P. K. C. Austwick.

Of the earlier journals, the only parts available are:

The Annals of the Andersonian Naturalists' Society:

Volume IV	Part 3	£1.00
-----------	--------	-------

Proceedings and Transactions of the Natural History Society of Glasgow:

Volume I	(1885-86)	Part 3	} £1.50 each
Volume II	(1886-88)	Parts 1, 2	
Volume VI	(1899-1901)	Parts 1, 2	
Volume VII	(1904-05)	Part 3	
Volume VIII	(1905-08)	Parts 1, 2	

Orders for any of the above and for copies of the current and future issues, or for reprints or photocopies should be addressed to *The Librarian*:—

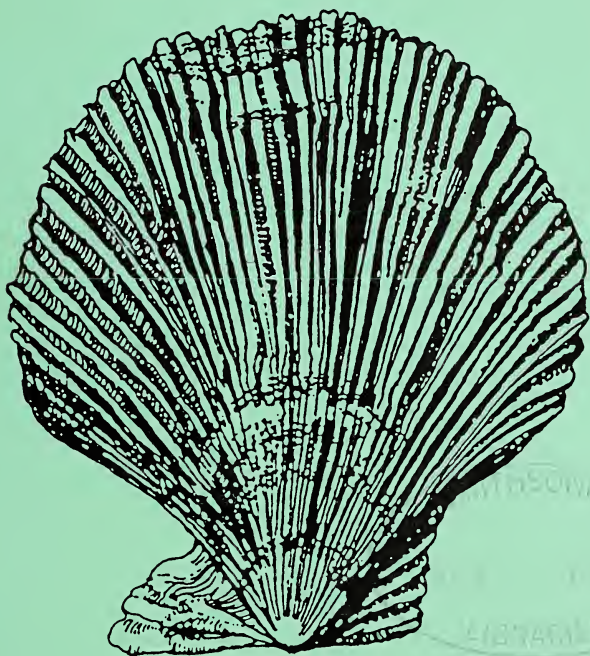
Mrs R. H. DOBSON,
664 CLARKSTON ROAD,
GLASGOW, G44 3YS.

Contents

Page

- 1 William Buckham Lorrain, amateur Malacologist and first Vice-President of the Natural History Society of Glasgow, F. R. WOODWARD
- 5 Spiders from Wallacebank Wood, Stirlingshire, S. I. BALDWIN.
- 10 Book Reviews: A Key to Case-bearing Caddis Larvae of Britain and Ireland, I. D. & B. WALLACE & G. N. PHILIPSON; Atlas of the Living World, D. ATTENBOROUGH, P. WHITEFIELD, P. MOORE & B. COX.
- 11 Some Observations on Scottish Wildcats *Felis silvestris* based on the Results of Autopsies, D. J. JEFFERIES.
- 20 Publication Received: Flowers of the Mediterranean, O. POLUNIN & A. HUXLEY.
- 21 A Survey of Water Beetles in the Western Highlands and on Mull, G. N. FOSTER, M. G. SPIRIT & D. COUNSELL.
- 29 Advertisement: The Flora of the Clyde Area, J. R. LEE.
- 30 Book Reviews: A Guide to Spiders of Britain & Northern Europe, D. JONES; Creating a Wildlife Garden, B. & L. GIBBONS.
- 31 The Natural History of the Muck Islands, North Ebeudes 7. Insecta: Apterygota and Exopterygota, R. M. DOBSON.
- 40 Book Review: The Hebrides, J. M. & I. L. BOYD.
- 41 *Ledum* on Flanders Moss; I. C. CHRISTIE.
- 47 The Freshwater Invertebrates of the Dunbeath Estate, Caithness, M. G. SPIRIT & J. L. RYRIE.
- 59 The Ferns of Ailsa Craig and their Distribution, B. ZONFRILLO.
- 64 Book Review: Eagles, J. A. LOVE.
- 65 Memoirs of a Midden Mavis — The Study of Ancient Diets and Environments from Plant Remains, C. DICKSON.
- 76 Erratum: Vol. 21 part 5, 1990.
- 77 Insect Records from the West of Scotland in 1989, I. C. CHRISTIE.
- 81 The Five Kingdoms Database — A Practical Guide to the Biological Nomenclature of the World of Organisms, R. S. Lt. GRIFFITH; Acknowledgments.
- 82 Short Notes, A. McG. STIRLING.
- 96 Book Reviews: The Natural History of Moles, M. L. GORMAN & R. D. STONE; A Guide to Bats of Britain & Europe, W. SOHOBER & E. GRIMMBERGER; The identification of Flowering Plant Families, P. H. DAVIS & J. CULLEN; The Manx Shearwater, M. BROOKE; Where to Watch Birds in Scotland, M. MADDERS & J. WELSTEAD; Islands in the Sound, Wildlife in the Hebrides, A. JOHNSON; Atlas of the British Flora, F. H. PERRING & S. M. WALTERS.
- 100 Proceedings 1989.
- 102 Officers & Council Session XLXIX 1989.

The Glasgow Naturalist



A fossil of *Chlamys islandica* (Muller) from the Clyde Beds at Linwood

Volume 22

Part 2
1992



The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow, the University of Strathclyde or the Glasgow Art Gallery and Museum.

The present rates of subscription per annum are: for Ordinary Members, £10; for Junior Members, £5; for Family Members, £2; and for School Members, £1. Further information regarding the Society's activities and membership application forms are obtainable from the *General Secretary*:

C/O NATURAL HISTORY DEPARTMENT,
MUSEUM & ART GALLERY,
KELVINGROVE,
GLASGOW, G3 8AG.

The Glasgow Naturalist

Published by the Glasgow Natural History Society
ISSN 0373-241X

February 1992
Price £6.00

Edited by R. M. Dobson with the assistance of J. H. Dickson, R. H. Dobson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Clapham, A.R., Tutin, T. G. & Warburg, E. F. 1981. *Excursion Flora of the British Isles*, Ed. 3. Cambridge.

All communications on editorial matters should be sent to:

Dr R. M. DOBSON,
ZOOLOGY DEPARTMENT,
UNIVERSITY OF GLASGOW,
GLASGOW G12 8QQ.

A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

Further Notes on the Reverend John Stuart's Contribution to the Discovery of Britain's Mountain Flowers

JOHN MITCHELL

Nature Conservancy Council for Scotland
22 Muirpark Way, Drymen, by Glasgow G63 0DX.

In an earlier paper (*Glasgow Naturalist* 21: 119-125) I described the pioneer role played by the Rev. John Stuart D.D. in the exploration of the Scottish mountain flora, particularly of his native Perthshire hills. Since then, two publications have come to my notice that prompt further comments on the subject.

In the first work — *Willows and Poplars of Great Britain and Ireland* (Meikle, 1984) — the author discusses the obvious confusion in the Rev. John Lightfoot's *Flora Scotica* (1777) between *Salix arbuscula* L. and *S. myrsinites* L., concluding that all the entries for the latter recorded by the Rev. Stuart from the richer Breadalbane Hills should be referred to *S. arbuscula*. This does not mean another 'first' for Stuart however, for this attractive upland willow had been found even earlier by the Rev. John Walker, specimens under the name *S. vacciniifolia* being collected from the Moffat Hills in July 1762 (Walker, 1808; Taylor, 1959). Despite these early problems in identification, Stuart's first British record of *S. myrsinites* still stands, based on material collected from the mainly quartzite hill of Schiehallion in September 1776 (Stuart, 1777). It is worth noting that by the turn of the century, Stuart had both species of willow sufficiently well established in his garden at Luss to be able to supply plants to correspondents (Mitchell, 1987).

The second publication — *John Lightfoot: His Work and Travels* (Bowden, 1989) — not only lists the Lightfoot herbarium (containing a number of Stuart specimens), but also draws attention to the existence of the Rev. Lightfoot's personal copy of *Flora Scotica*. Housed at the National Library of Scotland in Edinburgh, this interleaved copy, divided into four parts, contains many annotations in Lightfoot's own handwriting. These comprise both new species and additional



Fig. 1a. Drawing of *Erigeron alpinum* from Sowerby & Smith. Fig. 1b. Lightfoot's handwritten entry for *E. alpinum* in his personal copy of *Flora Scotica* (1777).

Erigeron alpinum. Lin.
 This was found in the Clefts of a high
 Rock on the East Side of Ben-Lawers, by
 Mr. Stuart, who communicated four specimens
 1787.

localities for species already included in the *Flora*, almost certainly in preparation for a completely revised second edition. In the event, changes made to the second edition issued in 1789 shortly after the Rev. Lightfoot's untimely death were limited to the title page and preface. Within the context of this paper, by far the most significant entry in Lightfoot's copy of the *Flora* is confirmation of the Rev. Stuart's gathering of *Erigeron borealis* (Vierh.) Simmons (*alpinum* of early British authors, Fig. 1a) on Ben Lawers in 1787, thus firmly establishing that Stuart was the first botanist to work this famous hill. Until now, this important record had rested solely on an annotation made to the surviving catalogue of Professor John Hope's lost herbarium (see Balfour 1907), a very brief entry scribbled in by an unknown person at least a year after Dr Hope's death in 1786. Lightfoot's more detailed note reads as follows: "Erigeron alpinum. Lin: This was found in the Clefts of a high Rock on the East Side of Ben-Lawers, by Mr Stuart, who communicated fair Specimens 1787" (Fig. 1b).

Acknowledgments

The accompanying photograph of the Rev. Lightfoot's entry in his personal interleaved copy of *Flora Scotica* is reproduced by kind permission of the Trustees of the National Library of Scotland.

References

- BALFOUR, I. B. 1907. Eighteenth Century Records of British Plants. *Notes R. Bot. Gdn. Edinb.* No. 18: 123-192.
- BOWDEN, J. K. 1989. *John Lightfoot: His Work and Travels*. Kew and Pittsburgh.
- LIGHTFOOT, J. 1777. *Flora Scotica* (2 vols.). London.
- MEIGLE, R. D. 1984. *Willows and Poplars of Great Britain and Ireland*. B.S.B.I. Handbook No. 4. London.
- MITCHELL, J. 1986. The Reverend John Stuart D.D. (1743-1821) and his contribution to the discovery of Britain's Mountain Flowers. *Glasg. Nat.* 21: 119-125.
- MITCHELL, J. 1987. The Botanical Garden of the Reverend John Stuart of Luss. *BSE News* No. 47: 6-7.
- SOWERBY, J. and SMITH, Sir J. E. 1863-72. *English Botany* (3rd ed.) by Boswell-Syme, J. T. London.
- STUART, REV. J. 1777. Letter to Sir Robert Menzies, 25th February 1777. Banks correspondence, ADD. MS. 33977. 65-72, British Museum.
- TAYLOR, G. 1959. John Walker, D.D., F.R.S.E., 1731-1803. A Notable Scottish Naturalist. *Trans. Bot. Soc. Edinb.* 38: 180-203.
- WALKER, REV. J. 1808. *Essays on Natural History and Rural Economy*. Edinburgh.

Book Reviews

Flowers of the Mediterranean (3rd edition)

OLEG POLUNIN and ANTHONY HUXLEY

Chatto and Windus, 1990, 260 pages, colour illustrations and line drawings. Limpback, ISBN 0-7011-3695-2, £12.99.

Flowers of the Mediterranean was first published in 1965 and this third edition has not changed in any major way from the first edition. The nomenclature has been altered to that recommended by *Flora Europaea* and other relevant modern authorities. There are some additions to the bibliography and other minor changes in the text. This has been carried out by Anthony Huxley as Oleg Polunin died six years ago. That this book has stayed in print so long is a measure of the care that went into its original production but its success is also partly due to the fact that it has been the only reasonable Flora of this area. As people who have visited the Mediterranean will know it is by no means comprehensive and one needs to take at least three books including one on orchids and one on trees, together with any local flower books that may be available.

Until a more detailed Flora of the Mediterranean becomes available the present volume remains indispensable.

AGNES WALKER

Crucifers of Great Britain and Ireland

T. C. S. RICH.

BSBI Handbook No. 6.

Botanical Society of the British Isles, London, 1991, 336pp., line drawings. Paperback ISBN 0 901158 20 8, £10.75.

This is the latest in a series of Handbooks published by the BSBI, the aim of which is to aid identification of plants within a family by providing keys, in depth descriptions and detailed drawings.

This book covers the 138 crucifer species most likely to be found in the British Isles. It includes all native species, and aliens with more than five records since 1950.

A chapter on characters acts also as an illustrated glossary. The key section is well augmented by line drawings. Then follows 138 individual plant descriptions with comprehensive figures. Finally there are distribution maps for 60 species, chosen because they had not previously been mapped, or had poor or outdated maps in the *Atlas of the British Flora*, or where a map might help with identification.

An immense amount of work has been expended on the preparation of this Handbook. The quality of description and illustration is first class. Many crucifers are superficially similar. This book is therefore highly recommended to anyone engaged in plant identification at whatever level.

P. MACPHERSON

A Note on the Crayfish of Loch Croispol

W. J. THOMAS

6 Stewarthill Gardens, Dumfries DG1 3AS.

Since the publication of Huxley's monograph (1880), it has been assumed that no crayfish occur in Scotland. However, in 1980 the first record of the freshwater crayfish *Austropotamobius pallipes* (Lereboullet) (Fig. 1) in Loch Croispol was made by Mr A. Macarthur of Lairg. The identity of two of his specimens sent to the Scottish National Museum was confirmed by the present author. Other observations of crayfish in Loch Croispol were made by R. N. Campbell in 1982 and 1983 (but not 1984) (pers. comm.). Holdich (1988) found no crayfish in the loch in 1987 and suggested that they had become extinct. However, the present author's records of crayfish in the loch from 1984 to 1990 indicate that this is not the case.

Loch Croispol is a coastal freshwater loch near Durness, Sutherland, grid ref. NC 39-68-. The loch is about 1.5 hectares in area and it lies in a basin of Cambrian limestone at an altitude of only 10m. Due to its position and altitude Loch Croispol is pampered climatically. Only once in the last 15 years (1978) has it frozen over. There are shallow littoral zones along most of the edge of the loch between 0-2m, and an abundance of limestone rubble much of which is covered by tufa.

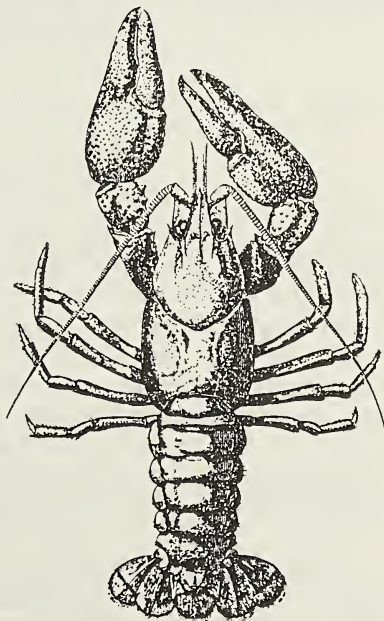


Figure 1:
Male crayfish (from Huxley, 1880).

At the southern edge the bed of the littoral zone has an abundance of limestone slabs lying on soft marl. This is where most of the crayfish have been found. Vegetation is sparse in the littoral zone, although *Chara* spp., *Myriophyllum* spp. and other macrophytes are present. During the summer a variety of small crustaceans, molluscs and annelids inhabit the marl.

The author visited the loch in 1984, 1986, 1987, 1989 and 1990. On these occasions crayfish were collected by hand. The animals were sexed and the length of the carapace measured from the tip of the rostrum to the posterior margin. Specimens were returned to the water. A summary of the findings is given below.

1984 June 15th, 16th	Sightings only of 5 yearling crayfish.
1986 June 16th, 17th	1 large ovigerous female, carapace length 30mm; 4 other moulting specimens too vulnerable to measure.
1987 early August	4 females, carapace lengths 26, 30, 28, 23mm.
1989 July 8th, 9th	9 males, carapace lengths 10.5, 11, 11, 12.6, 10, 11, 24, 23, 20mm; 1 female, carapace length 22mm; 1 soft-shelled newly moulted specimen.
1990 May 27th-June 16th	No crayfish found.
July 21st-Aug. 2nd	5 females, carapace lengths 23, 43, 18, 28, 20mm; 5 females, carapace lengths 48, 16, 22, 32, 21mm; sightings of 4 other specimens which evaded capture.

In view of the time taken to capture these small numbers of specimens, the population appears to be very small. It was therefore impossible to estimate either population size or age groups constituting the population. There is no reliable method for determining age directly from crayfish and therefore age must be estimated from length/distribution data, for which large numbers of specimens are required (see Brown and Bowler, 1977, 1979). However, the wide range of sizes (10.5-48mm) found in these small catches, the presence of well developed glair glands on the larger females, and the sighting of an ovigerous female in 1986 all suggest an actively breeding population.

The origin of this population is of obvious interest. Native European crayfish are of post-glacial origin (Albrecht, 1983). With the retreat of the ice-cap around 10,000 years ago crayfish moved into Europe from more southerly latitudes. The British Isles separated from mainland Europe around 7,500 years ago, and so *A. pallipes*, the single native crayfish species, either migrated early from Europe or was introduced

later by man (Albrecht, 1983; Holdich, 1988). The Loch Croispol population is the most northerly in Britain, being about 230 miles north of the River Aln in Northumberland where the presence of *A. pallipes* has been documented by Jay and Holdich (1981).

Before the discovery of the Loch Croispol population in 1980 by Mr A. Macarthur, Jay and Holdich (1981) suggested that the absence of *A. pallipes* from Scotland could be explained by the presence of the Southern Uplands fault and the hard weathering rock strata south of it, extending to the English border. The river systems in this area run over acidic substrates and peaty soils, both inimical to the survival of crayfish. The existence of this natural barrier, the fact that no crayfish have been found in the neighbouring Lochs Borralie, Lanlish and Caladail, all of which appear to be equally capable of supporting crayfish, and their absence from the rest of Scotland, make their occurrence in Loch Croispol all the more remarkable. However, it has been reported to the author that in 1945 crayfish were introduced into the feeder stream of Loch Croispol by Mr Hugh Campbell, keeper of the Keadal Estate, Durness (pers. comm. from William Campbell, Durness, who was present at the introduction). It appears, therefore, that the crayfish of Loch Croispol do not represent a post-glacial relict.

Acknowledgments

The author would like to thank the John Ray Trust for financial support. Special thanks are due to Mr A. Macarthur of Lairg, Dr R. N. Campbell of Pitlochry, Mr Ian Macarthur of Inverness, and Mr W. Campbell of Durness.

References

- ALBRECHT, H., 1983. Besiedlungsgeschichte und ursprüngliche holozäne Verbreitung der europäischen Flusskrebse. *Spixiana* 6: 61-77.
- BROWN, D. J. AND BOWLER, K., 1977. A population study of the British freshwater crayfish *Austropotamobius pallipes* Lereboullet. *Freshwater Crayfish* 3: 33-50.
- BROWN, D. J. and BOWLER, K., 1979. Relationship between size and age throughout the life cycle in *Austropotamobius pallipes*. *Freshwater Crayfish* 4: 35-42.
- HOLDICH, D. M., 1988. The dangers of introducing alien animals with particular reference to crayfish. *Freshwater Crayfish* 7: 15-30.
- HUXLEY, T. H., 1880. *The Crayfish: An Introduction to the Study of Zoology*. Kegan, Paul & Co., London.
- JAY, D and HOLDICH, D. M., 1981. The distribution of the crayfish *Austropotamobius pallipes* in British waters. *Freshwater Biology* 11: 121-129.

Book Reviews

Bird Watching for the Under Tens

BILL ODDIE

George Philip, London, 1991, 48pp., colour photographs and drawings. Hardback ISBN 0 540 012440, £6.99.

"If you would like to be a birdwatcher but are convinced there are only sparrows in your back garden, this book will show you how wrong you are".

Bill Oddie's enthusiasm for bird watching is infectious. He writes of his own initiation into the fraternity and offers tips on: buying and making sense of field guides, how to persuade someone to buy you a pair of binoculars, what to take with you when you go bird watching, how to take field notes, how to watch birds in different habitats and how to learn from the experts you meet at bird reserves.

He introduces the complexities of migration as "why bird watching is so exciting. Anything can turn up anywhere", and suggests how to increase your chances of spotting a lost migrant and so perhaps finding a rarity.

On the last page he suggests how to develop further an interest in bird watching.

This book provides an introduction to a fascinating hobby not just for the "Under Tens" but for anyone with an interest in, but little knowledge of, birds and how to watch them.

LYN DUNACHIE

Birds and Forestry

MARK AVERY and RODERICK LESLIE

T. & A. D. Poyser Ltd., London, 1990, photos, drawings, diagrams. Hardback, ISBN 0-85661-058-5, £18.00.

A controversial subject, these days, dealt with by two authors who work in both ornithology and forestry. The book gives a rather blinkered view of the argument about commercial forestry and the resulting destruction of upland habitat used by birds, many of them locally rare or declining.

Thirty-two birds are listed as dependent on moorland and subject to status change, but in fact only 15 could be considered as truly upland species. Species such as Hen Harrier would be fairly common birds, perhaps on farmland, as in America, if not persecuted. They certainly do not need young plantations to exist.

The isolated population of Arctic Skuas of Jura, which have been affected by forestry, are not even mentioned.

The authors have a sympathy for forestry and seem unable to envisage a land without the hand of man interfering. Man's intervention should perhaps only be restorative in future. The present planting regimes should be drastically curtailed. After about a thousand years of deforestation, much of upland Scotland could be restored to something approaching originality. At the moment the foresight and desire to do so are missing.

While I disagree fundamentally with the author's approach, I would recommend everyone to read this book and judge for themselves. It covers a range of forestry management and conservation related issues in a readable style, it is well produced and is good value.

BERNARD ZONFRILLO

Cotoneasters in the Glasgow Section of V.C.77

P. MACPHERSON¹ and E. L. S. LINDSAY²

¹15 Lubnaig Road, Glasgow G43 2RY.

²18 Monreith Road, Glasgow G43 2NY.

This paper is concerned with the records made in the Glasgow area by the authors since they became interested in the genus. As one author (PM) is the plant recorder for Lanarkshire (V.C.77), records are limited to those in that vice county. The first sighting of each species was a new V.C. record. The illustrations, with one exception, have been drawn from fresh local material. As *Cotoneaster adpressus* is not now available locally the drawing is from the herbarium specimen.

C. adpressus (Fig. 1).

In 1986 a plant identified as possibly of this species was seen on a complex of old bings at Cambuslang. Unfortunately the site was cleared for development before either flowers or fruit could be obtained for verification.

C. atropurpureus (Fig. 2).

In 1987 a single specimen of this plant was found on a flattened coal bing and in 1988 another on a derelict industrial site, both under willow scrub in Cambuslang. A further plant was seen in 1990 beside a riverside track in Oatlands.

C. bullatus (Fig. 3).

In 1986 a plant of this species was noted on waste ground in a triangle between a housing scheme and an allotment in Craigton. In the same year it was seen also behind a building in an industrial site in the same district. Subsequently five other records have been made along roadside walls or fences and there are at least 15 small seedlings widely scattered at the west end of what was the Glasgow Garden Festival Site.

C. cashmiriensis (Fig. 4).

A small seedling was seen growing under a rail in the cut-off section of Hospital Street in Gorbals in 1991.

C. dielsianus (Fig. 5).

A colony was detected in a tiny wood on an old dock at Yorkhill in 1985 and in 1986 two plants alongside a fence at Drumoyne.

C. divaricatus (Fig. 6).

In 1987 a single plant was first noted at Meadowside along a building on a semi-derelict industrial estate.

C. franchetii (Fig. 7).

A single plant grew in 1987 by a wall in waste ground off the Old Rutherglen Road in the Hutchesontown district. It was destroyed by rebuilding the following year. However in 1991 a strong fruiting specimen was seen at the side of one of the original buildings of Ruchill Hospital.

C. frigidus x *C. salicifolius* (= *C. x watereri*) (Fig. 8).

This plant was first found in shrubby ground and along a fence at Shieldhall in 1984. In 1987 a single plant was noted at the foot of a wall along a railway line at Bellahouston, another occurred in 1989 at a lane side in Hyndland and, in 1991, a further specimen was found on waste ground at the site of the Garden Festival. The range of leaf shape is remarkable but not unexpected considering the parentage.

C. horizontalis (Fig. 9).

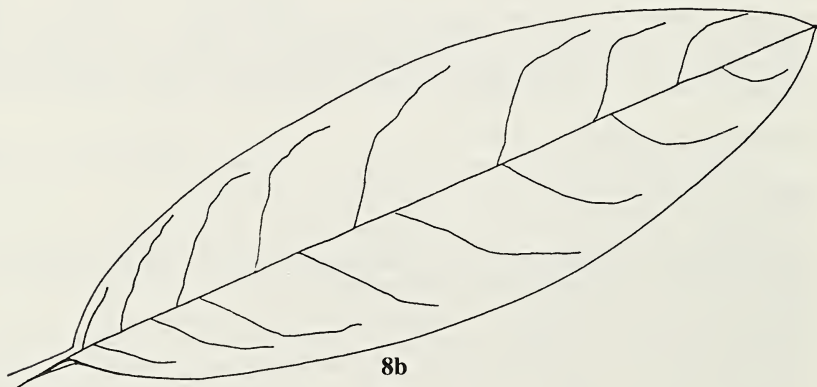
This species was first seen on a stoney bank surrounding the old Cathkin Quarry in 1982 but was subsequently destroyed by refuse tipping. Extant sites are waste ground under a shrub at Shieldhall in 1984, subsequently in similar habitat at Cambuslang and more recently noted on a rocky outcrop in a field at Thorntonhall. There is also a small plant at the west end of the site of the 1988 Garden Festival.

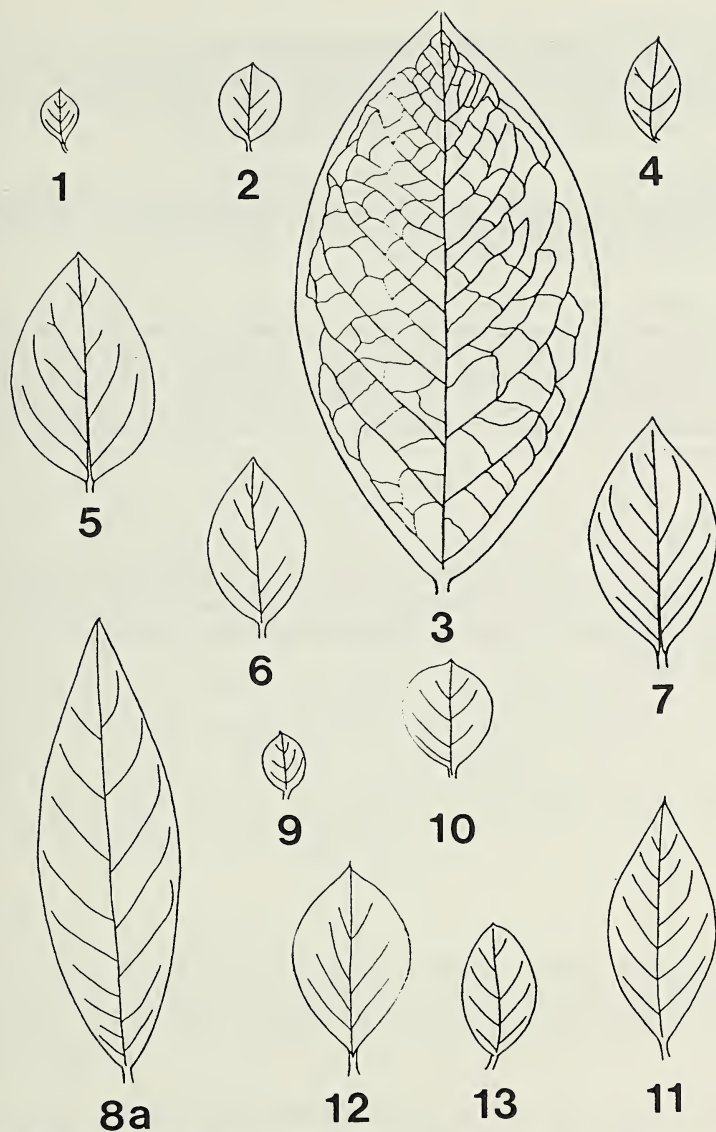
C. hjelmqvistii (Fig. 10).

Plants have been noted since 1989 growing on the top of wooden piles at what was previously the Custom House Quay. The plants arch outwards and downwards towards the river.

C. salicifolius (Fig. 11).

In 1988 a single specimen was noted growing in a crack in old foundations beside the abandoned tennis court at Ruchill Hospital. This plant was still present in 1991 when a further smaller seedling was seen about 30 yards distant.





Figs. 1-13, leaves of *Cotoneaster* species – life size. (1) *C. adpressus*; (2) *C. atropurpureus*; (3) *C. bullatus*; (4) *C. cashmiriensis*; (5) *C. dielsianus*; (6) *C. divaricatus*; (7) *C. franchetii*; (8a&b) *C. frigidus* x *C. salicifolius*; (9) *C. horizontalis*; (10) *C. hjelmqvistii*; (11) *C. salicifolius*; (12) *C. simonsii*; (13) *C. x suecicus*.

C. simonsii (Fig. 12).

The first record for this species was in 1984 from a stream side near the Linn Cemetery, since when it has been seen in four neighbouring 1km squares. It has also been recorded from the "tip of Lanarkshire's nose" and from eight other westerly squares. All have been in woodland, waste ground or roadside.

C. x suecicus (Fig. 13).

The parentage of this hybrid is in doubt but it may be *C. dammeri* x *C. conspicuus*. In 1991 a seedling was seen near the old Canting Basin, Prince's Dock on waste ground at the site of the Glasgow Garden Festival.

C. horizontalis and *C. simonsii* have been the species most commonly grown in gardens in the west of Scotland and therefore the most likely to be found in a naturalised site. However garden centres are stocking an ever wider range and recently there has been much more diversity in landscape planting. These factors give an increasing likelihood of finding other species in wild situations. Most of the sites of introduction have been under shrubby trees or alongside buildings, walls or fences indicating spread by bird droppings.

Acknowledgments

We are very grateful to Mr J. R. Palmer, a BSBI referee for the genus, who has been responsible for practically all the identifications. We are indebted also to Mrs J. Fryer who kindly named some of the remaining plants.

A Late-Devensian Marine Fauna from the 'Clyde Beds', Linwood and Johnstone, Renfrewshire

J. GORDON TODD

'Eastfield', Tandlehill Road, Kilbarchan, Renfrewshire
PA10 2DQ.

At the end of the last main ice age (Dimlington Stade, Rose, 1985), which Price (1983) suggested was over by 14,000 years before present (BP), *relative* sea level in the Clyde Estuary stood at a maximum altitude of 36m above Ordnance Datum (OD) at Paisley and 38m OD at Johnstone (Browne and McMillan, 1989). The clays deposited during the early period of marine inundation (Windermere Interstade) contain a very sparse fauna and are known as the Paisley Formation. These sediments are commonly overlain by the more thickly-bedded muds of the Linwood Formation, which contains a rich boreal fauna including *Arctica islandica* (L.) and *Modiolus modiolus* (L.). Radiocarbon datings of *Arctica* shells have given a range of ages from c. 13,500 to 11,930 years BP (Peacock, 1971; Sutherland, 1986). Opportunities to examine the late-Devensian marine deposits are very infrequent. In July and August, 1990, during construction of the A740 Howwood/Johnstone/Linwood bypass, marine clays, informally known as the 'Clyde Beds', were exposed. This paper describes the lithology and palaeontology of the sediments.

Methods

It was not possible to examine the beds *in situ* because of on-going construction works but clays from two sites (Linwood NS 437 639 and Johnstone NS 425 637; see Fig. 1) were piled to one side and collection was permitted.

Approximately 40kg of fossiliferous clays were removed and, after soaking in tubs of water, the suspended material was discarded. The remaining sands and silts were sifted for macrofossils and their relative abundance noted. Washings from within the apertures of mature

specimens of the gastropods *Buccinum undatum* (L.) and *Littorina littorea* (L.) yielded small gastropods, immature bivalves and sea-urchin and sea-weed fragments.

Specimens of all molluscan species were sent to the British Geological Survey (BGS), Edinburgh for identification. A small amount of sediment from the Linwood site, permitting only a very limited survey, was examined at the Department of Geology and Applied Geology, University of Glasgow for determination of the microfauna (ostracods and foraminifers).

Bore hole records provided by Strathclyde Regional Council allowed the stratigraphic sequence to be determined.

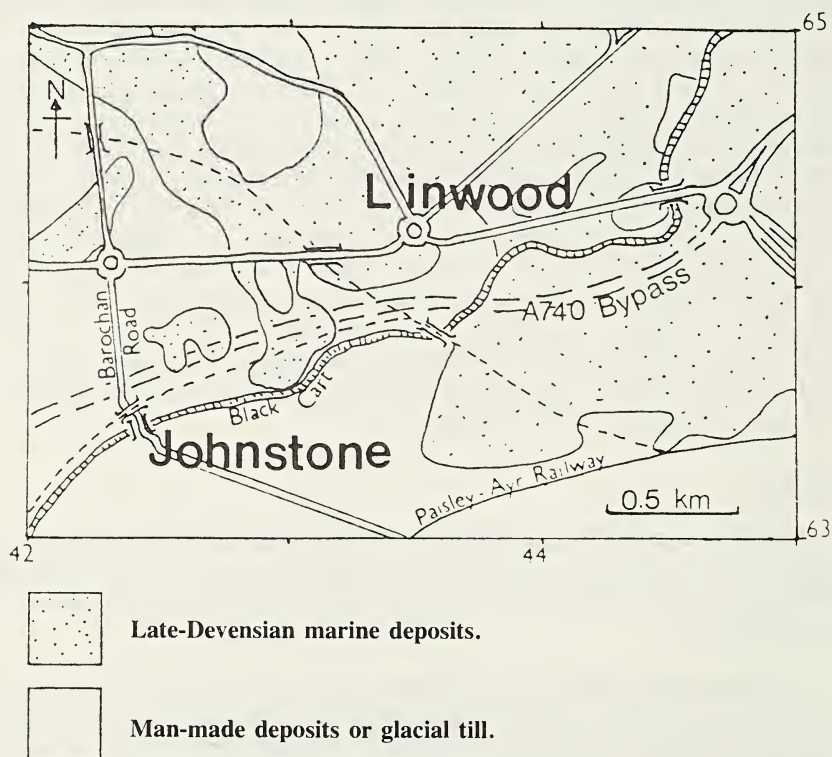


Figure 1. The surface distribution of the Quaternary deposits and their relationship to the A740 Howwood/Johnstone/Linwood Bypass.

Results

The typical lithofacies of the Linwood Formation and its position in the stratigraphic sequence are described. Species are listed for the Linwood and Johnstone sites, with details of their abundance and whether they are still living on the west coast of Scotland. Specimens were donated to Paisley Museum.

Lithology

Bore hole data showed that the marine sediments occupy the ground between Linwood and the Black Cart watercourse up to 7m above OD. The sediments are overlain by 1.0-1.5m of top soil and fill. The marine deposits, which are 4.0-6.5m thick, contain abundant molluscan and other faunal remains. They are clayey silts and silty clays, medium to dark grey becoming brownish at depth, thickly bedded with a soft to firm consistency and medium to low plasticity, and they contain isolated stones (up to 4cm) composed of coal, shale, micaceous sandstones and, occasionally, basalt.

Boulder clay (Wilderness Tilt), 0.5-1.5m thick, underlies the marine sediments and separates them from the Carboniferous micaceous sandstones and mudstones forming the basement rock (Fig. 2). From the bore logs, the marine sediments appear to extend no further than a few hundred metres to the east of Barochan Road (NS 424 637). This location may also have been the most south-westerly extent of the late-Devensian sea.

Palaeontology

PROTISTA

FORAMINIFERIDA

The following were found at Linwood; no specimens from Johnstone were examined.

Elphidium clavatum Cushman.

Millammina fusca (Brady).

Quinqueloculina sp.

ARTHROPODA

CRUSTACEA

OSTRACODA

The following were found at Linwood; no specimens from Johnstone were examined.

Cytheropteron sp.

Elofsonella concinna (Jones).

Eucytheridia sp.



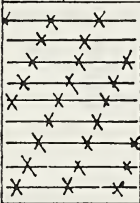
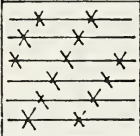
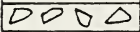
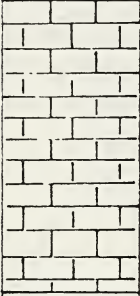

Legend	Depth (m)	O.D. level (m)	Description of Strata
	0.50	8.20	Topsoil
	2.00	6.70	Sand & gravel composed of shale (fill)
	5.00	3.70	Marine clays - Linwood Formation
	7.00	1.70	Marine clays - Paisley Formation
	7.40	1.30	Boulder clay (till)
	11.85	-3.15	Off-white fine grained sandstones
			Siltstones & mudstones

Figure 2. Typical succession at Linwood (near the Mill Lade) showing the position of the marine beds. Redrawn from Murdoch Mackenzie (Foundations) Limited Borehole No. 14 for Strathclyde Regional Council (1978). Ground level 8.70m OD.

CIRRIPIEDIA

Balanus sp.: abundant, mainly plates, rarely complete barnacles on rocks at Linwood; common, mainly fragments at Johnstone.

MALACOSTRACA

Fragments of crab carapace and claws: rare at Linwood.

MOLLUSCA

Examples of some of the fossils are shown in Figs. 3-11.

Because of changes in nomenclature, older names still commonly found in the literature are given in brackets, along with their modern equivalents. Arctic and recent species are distinguished as follows:

*+ Arctic forms still living in British seas.

** Arctic forms now extinct in British seas.

+ Recent molluscs found off the West coast of Scotland.

Abbreviations used: Lin. = Linwood site; Johnst. = Johnstone site; juvs. = juveniles; agg. = aggregate of several confused species.

AMPHINEURA

POLYPLACOPHORA

Shell plate of chiton at Johnst.

GASTROPODA

+*Puncturella noachina* (L.): uncommon at Johnst.

+*Acmaea virginea* (Muller): rare at Lin.

+*Lacuna vincta* (Montagu): uncommon at Johnst.

+*Littorina littorea* (L.): rare at Lin.; matures and juvs. abundant at Johnst. (Fig. 5.)

+*L. saxatilis* agg.: matures and juvs. uncommon at Lin.

+*L. obtusata* (L.) (*L. littoralis* agg.): common at Johnst.

+*Onoba aculeus* (Gould): rare at Johnst.

+*Rissoa parva interrupta* (Adams): rare at Lin.; abundant at Johnst.

+*Natica pallida* (Broderip & Sowerby): uncommon at Lin.

+*Tectonatica* (*Natica*, *Lunatia*) *affinis* (Gmelin): uncommon at Johnst.

+*Trophon* (*Boreotrophon*) *truncatus* (Strom): uncommon at Lin.; common at Johnst. (Fig. 4).

*+*Trophonopsis* (*Boreotrophon*) *clathratus* (L.): common at Lin.; very common at Johnst. (Fig. 3).

*+*Buccinum undatum* L.: uncommon at Lin.; matures and juvs. common at Johnst.

*+*Lora* (*Pleurotoma*) *turricula* (Montagu): rare at Lin.

+*Retusa obtusa* (Montagu) and var. *pertenuis*: uncommon at Lin.

BIVALVIA

+*Nucula* (*Nuculoma*) *tenuis* (Montagu): common at Lin.; uncommon at Johnst.

*+*Nuculana* (*Leda*) *minuta* Muller: uncommon at Lin. and Johnst.

** *N. (Leda)* *pernula* (Muller): juvs. common, mature rare at Lin. (Fig. 11).

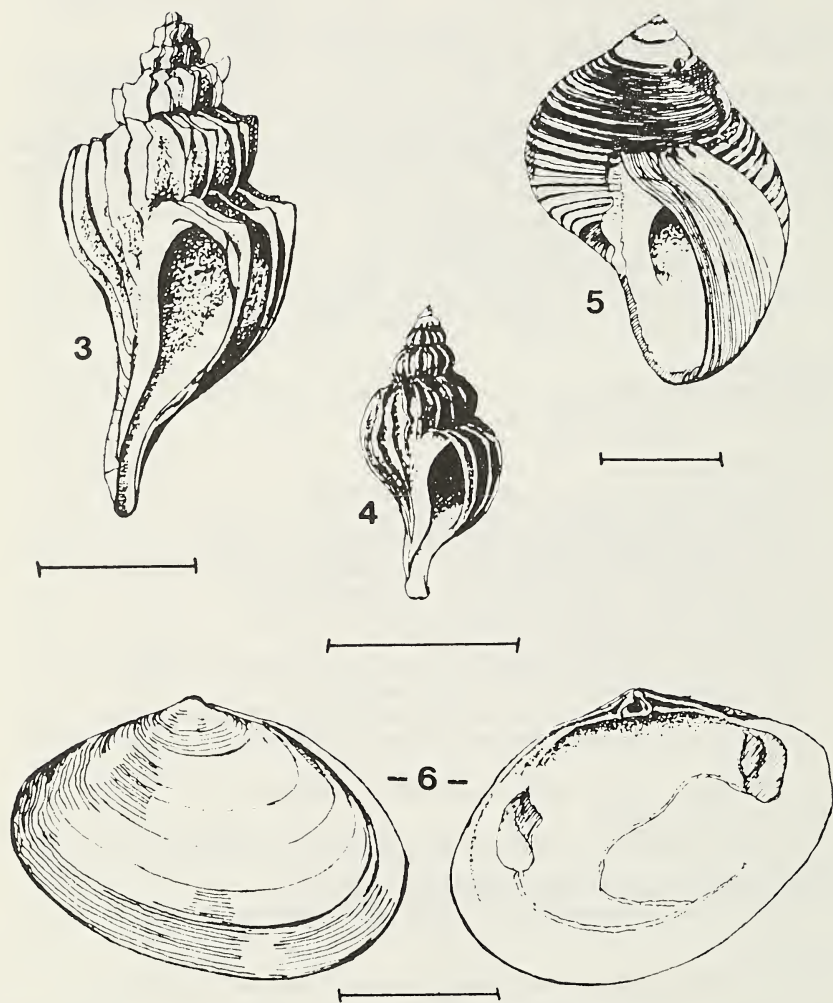
*+*Yoldiella lenticula* (Moller): abundant at Lin.; uncommon at Johnst.

+*Heteranomia squamula* (L.) (*Anomia ehippium* L.): rare at Lin. and Johnst.

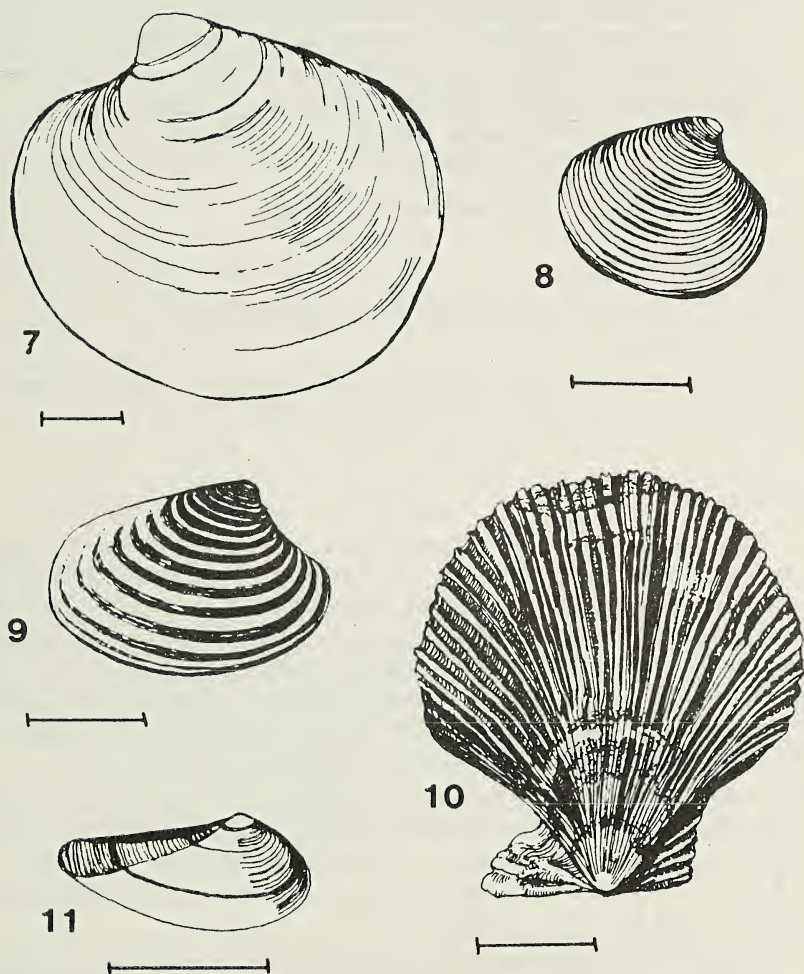
*+*Mytilus edulis* L. common at Lin.

*+*Modiolus modiolus* (L.): matures and juvs. abundant at Johnst.

** *Chlamys* (*Pecten*) *islandica* (Muller): rare at Lin. (Fig. 10).



Figures 3 – 6: (3) *Trophonopsis clathratus* (L.); (4) *Trophon truncatus* (Strom); (5) *Littorina littorea* (L.); (6) *Macoma calcaria* (Gmelin), outer (left) and inner aspects. Scale line in each case 10mm.



Figures 7 - 11: (7) *Arctica islandica* (L.); (8) *Astarte montagui* (Dillwyn); (9) *Astarte elliptica* (Brown); (10) *Chlamys islandica* (Muller); (11) *Nuculana pernula* (Muller). Scale line in each case 10mm.

*+*Astarte (Tridonta, Nicania) elliptica* (Brown): matures and juvs. rare at Lin. (Fig.9).

+*A. (Tridonta, Nicania) montagui* (Dillwyn): abundant with juvs. at Lin.; uncommon at Johnst. (Fig. 8).

+*Thyasira gouldi* (Philippi): rare at Lin.

*+*Arctica (Cyprina) islandica* (L.): matures and juvs. common at Lin.; juvs only common at Johnst. (Fig.7).

+*Parvicardium ovale* (Sowerby): rare at Lin.

*+*Macoma (Tellina) calcarea* (Gmelin): juvs. only, uncommon at Lin.; matures and juvs. common at Johnst. (Fig. 6).

*+*M. (Tellina) balthica* (L.): rare at Lin.

*+*Mya truncata* L.: matures and juvs. at Lin.

*+*Hiatella arctica* (L.): juvs only, rare at Johnst.

ECHINODERMATA

ECHINOIDEA

Plates of sea urchin test and spines: uncommon at Johnstone.

OTHER REMAINS

Sea weed fragments were common at Johnstone and a curved fragment of bone, 32mm. long, possibly the rib of a bird, was found at Linwood.

Discussion

The characteristics of the lithofacies are consistent with the sediments being sea-bottom muds estuarine in character. The fauna is generally of a shallow-water type associated with depths of less than 50m. The shells are well preserved and do not show signs of abrasion. Many are life-coloured, with preservation of the periostracum. Paired valves are common and occasional specimens of *Arctica islandica* have intact hinges. These findings suggest deposition in relatively calm conditions with little transportation of the assemblage after death.

Jardine (1986), on the basis of detailed work by others, especially Dr J. D. Peacock, interprets pebbles in the Linwood Formation, as ice-raftered dropstones, indicating the existence of shore ice in winter, as the Linwood-Johnstone and surrounding area is thought to have been glacier free at the time of deposition.

Although not fully arctic, the dominant foraminifer *Elphidium clavatum* and the ostracod *Elofsonella concinna* indicate marine conditions cooler than those in the Clyde estuary today. Other cold water indicators include the bivalves *Nuculana pernula*, *Yoldiella lenticula* and *Macoma calcarea*. Many of the Nuculidae and *Macoma calcarea* have a single hole bored in one of their valves, indicating predation by gastropods of the family Naticidae. Specimens of *Natica pallida* and *Tectonatica affinis* were found.

Although the two collecting sites were only 1.2km apart there were differences in species type and abundance. At Linwood, Nuculidae were much commoner, while Gastropods were rarer than at Johnstone. It is possible that the fossil assemblages at the two localities represent different horizons rather than different marine environments. The fauna from the Johnstone/Linwood section of the bypass is typical of the interstadial part of the 'Clyde Beds' that was deposited after the last main ice-age ended at c. 13,500 years BP but before the Loch Lomond Stade began c. 11,000 years BP (Peacock, 1987), when full arctic conditions returned to this part of Scotland.

Peacock (1971) suggested that the route of entry of the late-Devensian sea to the Paisley basin may have been through the Lochwinnoch Gap rather than via the Clyde estuary. This view is not supported by bore-hole data from sites near the low-lying ground occupied by the Black Cart between Kilbarchan and Barochan Road. The bore logs show that glacial till makes up the entire deposit above bedrock (Strathclyde Regional Council data). Drilling by the BGS at Lochwinnoch and by others (Dickson et al, 1976) at North Kerse (NS 339 556) also failed to find marine deposits. There appears to be no stratigraphical evidence to confirm that the sea occupied the Lochwinnoch gap in post-glacial times.

Acknowledgments

I am very grateful to Mr William Brown (Regional Engineer, Strathclyde) for access to the construction sites and for copies of the bore log data and to Mr. Steven Cartwright for helping with the collection of fossils. I am also indebted to Dr. Douglas Peacock (BGS) for identifying the mollusca, to Dr. Michael Keen (Glasgow University) for examining the microfauna and to Mr. David Mellor (Paisley Museum) for access to the Quaternary fossil collection. Finally, thanks are due to Mrs. Elise Macrae for the fine drawings of some of the shells.

References

- BROWNE, M.A.E. & McMILLAN, A.A., 1989. Quaternary geology of the Clyde valley. *British Geological Survey Research Report* SA/89/1.
- DICKSON, J.H., JARDINE, W.G. & PRICE, R.J., 1976. Three late-Devensian sites in West-central Scotland. *Nature*, 262: 43-44.
- JARDINE, W.G., 1986. The geological and geomorphological setting of the estuary and Firth of Clyde. *Proc. Roy. Soc. Edinb.*, 90B: 25-41.
- PEACOCK, J.D., 1971. Marine shell radiocarbon dates and the chronology of deglaciation in western Scotland. *Nature*, 230: 43-45.
- PEACOCK, J.D., 1987. A reassessment of the probable Loch Lomond Stade marine molluscan fauna at Garvel Park, Greenock. *Scott. J. Geol.*, 23, (1): 93-103.

- PRICE, R.J., 1983. *Scotland's environment during the last 30,000 years*. Edinburgh: Scottish Academic Press.
- ROSE, J., 1985. The Dimlington Stadial/Dimlington Chronozone: a proposal for naming the main glacial episode of the Late Devensian in Britain. *Boreas*, 14: 225-230.
- SEAWARD, D.R., 1990. *Distribution of the marine mollusca of north west Europe*. Nature Conservancy Council.
- SUTHERLAND, D.G., 1986. A review of Scottish marine shell radiocarbon dates, their standardization and interpretation. *Scott. J. Geol.*, 22, (2): 145-164.

Book Review

An Artist on Migration

BRUCE PEARSON

Harper Collins, 1991, 192 pages, numerous paintings.
Hardback, ISBN 0 00 219814 2, £19.99.

This beautifully produced and readable book is far more than a vehicle for the paintings of birds, both close up and in their natural surroundings. Chapters describing locations where birds can be seen in their breeding and wintering haunts in this country, along the Atlantic flyway from Holland, through Scandinavia to Greenland and in Africa convey the atmosphere and excitement of each, as do those concerned with passage over the Mediterranean.

They generate feelings of nostalgia or enthusiasm to visit, which are much enhanced by the paintings. The text is interspersed as appropriate with information about the origins and mechanisms of migration and the needs of and natural hazards to birds while breeding, wintering or on passage. He also incorporates the methods of study used at bird observatories and the problems caused by man's alteration of the environment and sporting interests. The haphazard inclusion of this information makes for a readable whole, but would make it difficult to refer to it.

This is a worthy addition to any birder's library and would make a good present.

RUTH H. DOBSON

Some naturally occurring Flowering Plant Hybrids in the Glasgow Area.

K. J. WATSON¹ and J. H. DICKSON²

¹Art Gallery & Museum, Kelvingrove, Glasgow
G3 8AG.

²Botany Department, University of Glasgow, Glasgow
G12 8QQ.

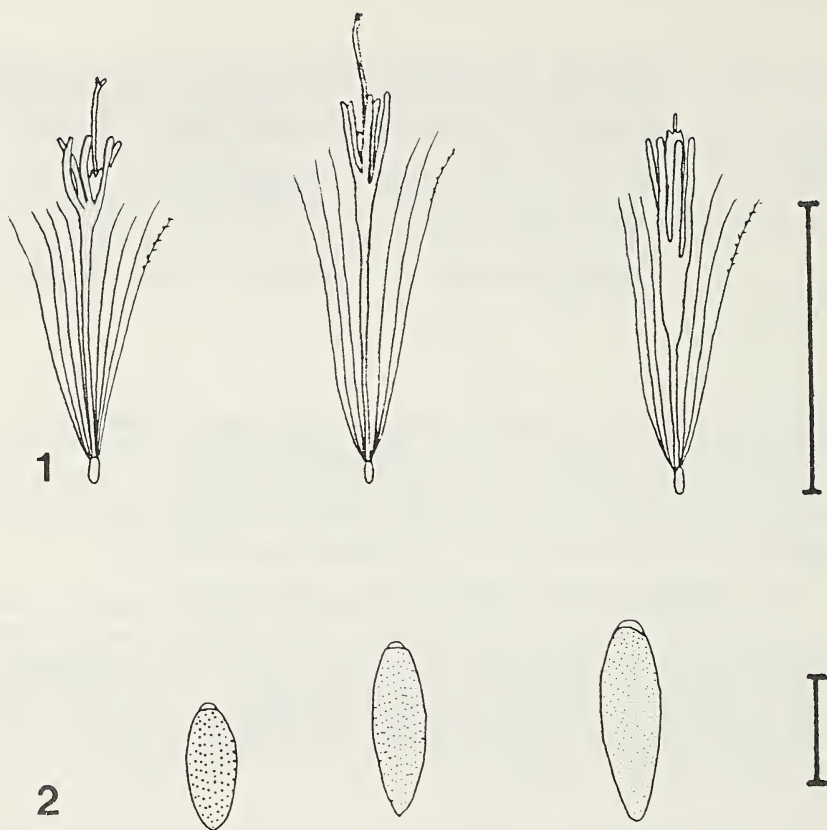
During the course of several summers of fieldwork for the Flora of Glasgow Project (Dickson, 1984, 1991) and the related MSC-funded Community Programme, "Botanical Surveys of Glasgow", many new discoveries and rediscoveries have been made. It is intended to publish results of this work as the first complete Flora of Glasgow.

The fieldwork has revealed that the occurrence of hybrids is not a rare phenomenon in the region. Stace (1975) provides an excellent discussion of hybridization, its effects on the flora and its importance in plant evolution, as well as a comprehensive survey of all the hybrids so far recorded for the British Isles. In 1980 he noted 626 substantiated, with 122 possible, interspecific hybrids for the British Isles out of a total flora of around 2500 species.

The following hybrids can occur in substantial populations, with or without the parents, and most occur at more than one locality, indicating either multiple origins or natural spread. The taxa recorded here do not represent a totally comprehensive list of all the hybrids to be found in the area; however it is hoped that the following records will bring to the attention of the many recorders in Glasgow and elsewhere in Scotland the range and interest of hybrids. Special note is made of several finds, some not recorded in this region previously.

Cirsium x celakovskianum Knaf. [*C. arvense* (L.) Scop. x *C. palustre* (L.) Scop.]

A single specimen, vegetatively distinct from the surrounding population of *C. arvense* was discovered by JHD in 1986, growing on a rough track below the partially wooded slopes of Bardykes Bing in south-east Glasgow, (V.C. 77, NS 673588). The stem has interrupted sinuous winging and the leaves are strongly spine-tipped. The inflorescence is variable but the sterile fruits attest to its hybrid origin. Close examination of the florets reveal its intermediate nature; Fig. 1 illustrates the differences in the corolla



Figs. 1 and 2: 1 Florets showing limb-tube ratios of *Cirsium arvense* (left) and *C. palustre* (right) with the hybrid *C. x celakovskianum* (centre). (Scale line = 1cm)
 2 Seeds of *Epilobium ciliatum* and *E. palustre* (left and right) with one of the rarely well formed seeds of the hybrid (centre). (Scale line = 1mm).

tube-limb ratios and also the different lobing of the limb. The hybrid florets have a long tube but are 5-partite to only about three quarters of the limb length. *C. palustre* is found at various sites close to the hybrid.

Sledge (1975) describes this uncommon hybrid from scattered localities north to Yorkshire. Scottish records include the Den of Airlie, (V.C. 90; Ingrams and Noltie, 1981); Helensburgh, (V.C. 99, NS 296823) collected by A. Rutherford (Herb Gl i.e. Herbarium at Glasgow University); Gartlea (V.C. 99) by I. C. Christie.

Epilobium Hybrids

Hybridization is a well known phenomenon in this genus; initial recognition is

indicated by the tall and branched habit and the sterility of fruits. Observation of features such as stigma lobing, stem lines and indumentum, leaf morphology and the occurrence of stolons provide indications of the parentage. Eight species occur in the region and the following hybrids have been either recognised in the field or subsequently from herbarium sheets.

E. ciliatum Rafin. x *E. obscurum* Schreb.

A single specimen on wasteground at Darnick Street, Garngad, Glasgow (V.C. 77, NS 614668) was collected by KJW in 1987. The two parents can look superficially similar but there are a number of distinctive features which clearly separate the two. The hybrid possesses frequent glandular hairs on the stem indicating *E. ciliatum* but the equal style-stigma ratio, petals notched to only one quarter and presence of stolons are all features of *E. obscurum*.

E. ciliatum Rafin. x *E. montanum* L.

The two parent species are the commonest species of *Epilobium* found in disturbed habitats around Glasgow. The hybrid is probably overlooked but the unequally notched stigma, weakly angled stem, broad leaves with attenuated apices and sterile fruits reveal the hybrid origin. Specimens have been collected from Kirkhill Bing, Cambuslang (V.C. 77, NS 653601, JHD, 1985) and Redlees Quarry, Blantyre (V.C. 77, NS 679598, KJW, 1987).

E. ciliatum Rafin. x *E. palustre* L.

Four similar specimens appearing intermediate between the parental species have been found at separate localities: Redlees Quarry, Blantyre (V.C. 77, NS 681597, KJW, 1987); Kilmardinny Loch, Bearsden (V.C. 99, NS 548730, G. Steven and JHD, 1987); Laigh Kenmure, Possil (V.C. 77, NS 593704, KJW, 1989); Lochfauld, Possil (V.C. 77, NS 590707, KJW, 1991).

The plants are luxurious with stolons and narrowly lanceolate leaves. However, the finely 4-angled stems and leaves broader than 1cm with weakly denticulate leaf margins, indicate the presence of *E. ciliatum*. Although the fruits are mostly sterile the best character is provided by the few well formed seeds (see Fig. 2) which, with their length (c. 1.7cm), fusiform shape, pellucid glands and striate tubercles, show a combination of the usually distinctive seed features of the two parents.

E. ciliatum Rafin x *E. parviflorum* Schreber.

Two specimens of this hybrid have been collected by KJW, 1990 from marshes in the south-east of Glasgow: Malcolmwod (V.C. 77, NS 677577) and Dechmont (V.C. 77, NS 66-57-). The plants are pubescent, particularly the long, narrow leaves and upper stem, although the hairs do not spread as in *E. parviflorum*. The petals are large, stigma notched and a few formed seeds possess weak striations.

Stace (1975), notes 14 V.C. records from the south England, the first being in 1934.

E. x limosum Schur. (*E. montanum* L. x *E. parviflorum* Schreber)

A specimen of this hybrid growing with both parents was collected by KJW in 1990 on a flushed slope at Cairnshill, Cambuslang (V.C. 77, NS 651595). The plant was sterile and appeared intermediate in general morphology. The leaves, which are often three-ranked, are pubescent but possess toothing and a broad base inherited from *E. montanum*. The flowers are large and stigma four lobed. Unlike those of *E. parviflorum*, the stem hairs do not spread.

The hybrid is recorded from several English V.C.s, to as far north as V.C. 67 (Stace, 1975).

It is noteworthy that nearly all these hybrids involve *E. ciliatum* which may be due to easier recognition because of its distinctive seed striation and glandular hairs. The recent introduction of this species from North America may be a factor and there may not have been time for the evolution of breeding barriers with native species. However, as discussed by Stace (1975), there is little evidence from artificial synthesis of anything but weak genetic incompatibility, the isolation results from predominantly inbreeding and possible ecological isolation. A more plausible explanation may be the resultant mixing of species in disturbed habitats; the Flora of the London Area (Burton, 1983) notes modern hybrids involving *E. ciliatum* which has expanded into habitats occupied by other species.

X Festulolium loliaceum (Huds.) P. Fourn. (*Festuca pratensis* Huds. *x* *Lolium perenne* L.)

This grass, which may not have been recorded in the Glasgow area for over 100 years, was found by JHD (1987), in the narrow rough at the side of Kirkhill Golf Course, southeast Glasgow (V.C. 77, NS 644581). Hopkirk (1813) recorded *Festuca loliacea* (''Very much resembling *L. perenne* occasionally in moist pastures and hedges''). Henedy (1891) recorded *F. pratensis* var. *loliacea* from the Clyde at Dalbeth (V.C. 77), while T. Wise collected a specimen (in Herb GL) from Auchenheath (V.C. 77), in 1912. Although common in England, Lewis (1975) described it as rather rare in Scotland. An interesting feature of this find was its occurrence in two distinct stands, one with a raceme of subsessile spikelets while the other stand of larger, more robust plants had branched inflorescences. Otherwise the two stands were very similar morphologically and both possessed a similarly large percentage of crumpled pollen grains. The difference may therefore be due to some phenotypic response to local environmental factors.

Glyceria x pedicellata Towns. [*G. fluitans* (L.) R. Br. *x* *G. plicata* Fr.]

Hybrid Sweet grass is a vigorous hybrid showing intermediate features of the two parents. The leaf sheaths are slightly rough (contrasted with the smooth sheaths of *G. fluitans*; the tongue is effective at distinguishing this), the inflorescence is less branched than *G. plicata* with fewer spikelets per branch and the lemmas are about 5 - 5.5 mm. long with an obtuse apex. The best features for recognising the hybrids are the lack of disarticulation of the sterile spikelets when mature and the anthers, which are intermediate in size (c. 1.5mm.) and are indehiscent.

Specimens from two populations of this hybrid have recently been collected by KJW in Glasgow: Garscadden Marsh, Drumchapel, (V.C. 99, NS 522709) and near Dechmont Hill (V.C. 77, NS 664584). Both parents are recorded at or near these localities. The hybrid was also reported by R. Mackechnie from Possil Marsh; a Lee specimen, dated 1913, from Possil Marsh also belongs to the hybrid. Examination of herbarium sheets in Herb GL has produced 7 specimens fitting the description of *G. x pedicellata*: New Galloway, V.C. 73; Johnstone Canal, V.C. 76; Duddingston Loch, V.C. 83; near Aberdour, V.C. 85; Kilpatrick and Clydebank, both V.C. 99; Millport, V.C. 100. This hybrid grass may be much more frequent in southern Scotland than previously assumed.

Hypericum x desetangsii Lamotte (*H. perforatum* L. *x* *H. maculatum* Crantz)

A selection of Glasgow specimens determined by N.K.B. Robson, were found to cover the whole range of *H. x desetangsii* nssp. *desetangsii*, from almost pure *H. maculatum* ssp. *obtusiusculum* (Tourlet) Hayek to very nearly pure *H. perforatum*. This hybrid is probably the commonest *Hypericum* in the Glasgow area. However,

although *H. perforatum* is common, the other parent seems to be rare. Many localities are associated with wasteground and both active and disused railways; occurrences in this latter habitat are discussed by Crackles (1990).

Hybrids can usually be recognised by a combination of features: stems with 2 distinct and 2 faint lines, leaves with lax, reticulate venation and a few pellucid glands and the intermediate sepals, obtuse and apiculate with slightly denticulate margins.

Of perhaps greater interest was the determination of a single specimen as being *H. x desetangsii* nssp. *carinthiacum* (Frohlich) N.K.B. Robson, (resulting from the cross between *H. perforatum* and *H. maculatum* ssp. *maculatum*), from Bothwell Castle (V.C. 77, NS 690593). Further collections from populations in this locality were all confirmed as showing the influence, to varying degrees, of *H. maculatum* ssp. *maculatum*. As populations of the only other British record, from Skipness, Kintyre (date 1899, determined by NKBR), have not been re-discovered (Kenneth, 1985), the Bothwell plants represent the only known extant population of nssp. *carinthiacum* in the British Isles.

Chromosome counts were attempted on the Bothwell populations to provide further evidence of the population's origin. Counts of $2n = 24$ would be expected for nssp. *carinthiacum*, as opposed to $2n = 32$ for the commoner hybrid. Unfortunately the counts were not totally conclusive, although most counts were in the range of $2n = 23 - 26$. A specimen in Herb GL, dated 1904, from Bothwell Castle, of *H. maculatum* ssp. *obtusiusculum*. (determined by NKBR), casts a shadow over the above observations. The Bothwell population may well reward further investigation.

Potamogeton Hybrids

This genus, which is very well represented in the Glasgow region, with twelve species recorded, frequently presents difficulties in identification due to its often mainly vegetative occurrence and phenotypic variability. Hybrids are commonly reported and can form well-established populations. Three hybrids are recorded, although they may not have originated within the area.

P. x nitens Weber (*P. perfoliatus* L. x *P. gramineus* L.)

Recent collections from Bardowie Loch, (V.C. 86, NS 582737), by the MSC team in 1986 revealed a population variable in leaf features, but the specimens correspond with those from the same site (1893) determined by Dandy & Walker in the Herb GL.

P. x bennettii Fryer (*P. crispus* L. x *P. trichoides* Cham. & Schlect.)

This locally endemic hybrid known only from the Forth of Clyde Canal in V.C. 77, 86 and 99 was found at various localities during a recent botanical survey of the canal, (Watson and Murphy, 1988). The ponds at Grangemouth where the plant was first recorded have been filled in, and with the lack of recent records east of 10km. square NS7/7, the Glasgow area populations represent the hybrid's world stronghold (C. Preston pers. comm.).

P. x sparganifolius Laest. ex Fries (*P. gramineus* L. x *P. natans* L.)

A fairly large population of this hybrid, with its distinctive submerged leaves, was found recently in the River Clyde, near Carmyle (V.C. 77, NS 654615), by A. Walker (1986); the hybrid also occurs further up-river with several localities near Uddingston (V.C. 77, NS 67/61, NS 68/61). The upper leaves are expanded while the submerged leaves have the long phyllodes characteristic of *P. natans* but these are expanded distally into a narrow ribbon-like lamina. The specimens agree with Dandy and Taylor determinations from River Doon, Ayr, (V.C.75), and Loch Garten, Inverness-shire,

(V.G. 96), in Herb GL, but they are somewhat more luxuriant. Hopkirk (1813) found *P. fluitans* in the Clyde at nearby Dalbeth. Although that name refers to the *P. natans* x *P. lucens* L. hybrid, Hopkirk's plant may well have been *P. x sparganifolius*. It is interesting to note, however, that *P. lucens* was also found at the same time as *P. x sparganifolius* (by A. Walker), but there are no recent records for *P. gramineus*).

Rumex Hybrids

Hybrids between *Rumex* species are well documented by Lousley and Williams (1975) and Lousley & Kent (1981). Apart from the frequent offspring of crosses involving the two commonest *R. crispus* and *R. obtusifolius*, (*R. x pratensis* Mert & Koch), three other hybrids have been noted.

R. x arnottii Druce (*R. longifolius* DC. x *R. obtusifolius* L.)

Hybrids are frequently found in disturbed habitats where the two parents occur. Their intermediate inflorescences are conspicuous and confirmation comes from the broad leaves, asperous below, as well as the wide tepals, often with a few small teeth, and the occasional poorly formed tubercle.

R. x propinquus Aresch. (*R. crispus* L. x *R. longifolius* DC.)

A single specimen found at the edge of a fen, Johnston Loch, Gartcosh (V.C. 77, NS 698688) by G. Steven (1986), can be recognised by its narrow glabrous leaves and its broad rounded tepals with usually one well formed tubercle.

R. x dufftii Hausskn. (*R. obtusifolius* L. x *R. sanguineus* L.)

This species was found with both parents on disturbed ground by the rough of the wooded Bothwell Castle Golf Course, (V.C. 77, NS 698586), by G. Steven (1986). The lower leaves are broad, slightly cordate and asperous on the abaxial midrib. The inflorescence is lax with many aborting flowers. The tepals are slightly lingulate, with finely toothed margins and several possess a single tubercle. Lousley and Williams (1975) records the hybrid north only to V.C. 48; however, Ingram & Noltie (1981) gave two records from Angus (V.C. 90) and Mitchell (1982), reported it from Loch Lomond.

Senecio x londinensis Lousley (*S. squalidus* L. x *S. viscosus* L.)

Two specimens of this hybrid have been collected from wasteground in the area: Clydebank Industrial Estate, by A. McG. Stirling, 1985 (V.C. 99, NS 506695) and Clydebridge Ironworks Site, Cambuslang by KJW, 1990 (V.C. 77, NS 630624). The plants are intermediate between the two parents in morphological features, branching habit and ligule lengths, but possess the black-tipped outer involucres of *S. squalidus*, and have glandular hairs from the other parent; the plants are sterile.

Benoit *et al.* (1975) refer to the frequency of the hybrid on wastegrounds in southern England and Wales, but account for its rarity in Scotland being due to the rarity of the parents. However in Glasgow *S. viscosus* is frequently recorded from wastegrounds and railways; it is known from sixty-six of the ninety tetrads covered by the Flora of Glasgow area. *S. squalidus* has become frequent on wasteground in urban areas over recent years (fifty-two tetrads). The hybrid is recorded as a ruderal from Leith (McKean, 1988).

Typha x glauca Godr. (*T. angustifolia* L. x *T. latifolia* L.)

Specimens collected in 1987 by J. Mitchell from Ladies Pond, Dougalston, Milngavie, to the north of Glasgow, (V.C.86, NS 571742) appear on morphological grounds to

be of hybrid origin. The leaves are up to 9mm wide, the sheaths possess a distinct shoulder, the male and female inflorescences are separated by a 5mm gap and the latter's spike is only 10mm in diameter. However, the pistillage flowers lack any bracts and the pollen is comprised totally of well formed tetrads. This contrasts with the observations of Alm & Weimarck (1933) who found female bracts and pollen in a mixture of single grains with various combinations of twos and threes as well as some tetrads, with several misshapen. Stace (1975) discusses the variability of presumed hybrids, which are seldom claimed for Britain.

Specimens labelled "Dougalston, 1919" collected by J. R. Lee in Herb GL show *T. angustifolia* (with solely monad grains, but some crumpled) occurred in the area. North American studies have indicated introgression occurring in *Typha* populations (Harms & Ledingham, 1986). Observations of the pond population in November certainly revealed it to be very variable. It is therefore possible that hybridization and subsequent backcrossing with the frequent *T. latifolia* may have occurred. Whatever the history, several members of this variable population are probably best considered to be of hybrid origin.

References

- ALM, G.G. & WEIMARCK, H. 1933. *Typha angustifolia* L. x *latifolia* L. funnen i skane. *Bot. Notiser.* 1933: 279-284.
- BENOIT, P.M., CRISP, D.C. & JONES, B.M.G. 1975. See STACE, 1975.
- BURTON, R.M. 1983. *Flora of the London Area*. London Natural History Society.
- CRACKLES, F.E. 1990. *Hypericum x desetangii* Lamotte nm. *desetangii* in Yorkshire, with special reference to its spread along railways. *Watsonia* 18, 63-67.
- DICKSON, J.H. 1984. Notes for the Flora of Glasgow I: Some grasses and other Monocotyledons. *Glasg. Nat.* 20, 465-468.
- DICKSON, J.H. 1991. *Wild Plants of Glasgow: Conservation in the City and Countryside*. Aberdeen University Press.
- HARMS, V.L. & LEDINGHAM, G.F. 1986. The Narrow-Leaved Cat-tail *Typha angustifolia* and the Hybrid Cat-tail, *T. x glauca*. Newly reported from Saskatchewan. *Can. Field Nat.* 100: 107-110.
- HENNEDY, R. 1891. *The Clydesdale Flora* (5th ed.). Hopkins, Glasgow.
- HOOKER, W.J. & ARNOTT, G.A.W. 1860. *The British Flora* (8th ed.). Longman, London.
- HOPKIRK, T. 1813. *Flora Glottiana*. J. Smith & Sons, Glasgow.
- INGRAM, R. & NOLTIE, H.J. 1981. *The Flora of Angus*. Dundee Museums and Art Galleries.
- KENNETH, A.G. 1985 Additions to the Flora of Kintyre. *Glasg. Nat.* 21, 1-12.
- LEWIS, E.J. 1975. See STACE 1975.
- LOUSLEY, J.E. & KENT, D.H. 1981. *Docks and Knotweeds of the British Isles*. BSBI, London.
- LOUSLEY, J.E. & WILLIAMS, J.T. 1975. See STACE, 1975.
- McKEAN, D.R. 1988. *A Checklist of the Flowering Plants & Ferns of Midlothian*. Botanical Society of Edinburgh.
- MITCHELL, J. 1982. Two new Scottish Dockens. *BSBI Scottish Newsletter* 4, 8-9.
- SLEDGE, W.A. 1975. See STACE 1975.
- STACE, C.A. (Ed.) 1975. *Hybridization and the Flora of the British Isles*. Academic Press, London.
- STACE, C.A. 1980. *Plant Taxonomy & Biosystematics*. Arnold, London.
- WALLACE, E.C. 1975. See STACE 1975.
- WATSON, K.J. & MURPHY, K.J. 1988. *The aquatic vegetation of the Forth & Clyde Canal*. Botany Department, Glasgow University.
- WEBSTER, M.M. 1978. *Flora of Moray, Nairn & Inverness*. Aberdeen University Press.

Book Notice

Wild Plants of Glasgow

J. H. DICKSON

with paintings by ELSPETH HARRIGAN and photographs by T. N. TAIT.

Aberdeen University Press, 1991, 208 pages, colour paintings and photographs. Hardback ISBN 0 08 041200 9, £14.95.

In this beautifully produced book the author's declared aim is "to introduce some of our special urban and rural plants and their natural histories to the many members of the general public who are interested in nature conservation".

He defines "Glasgow", in relation to the recent concentrated plant survey, as an area 20 by 18km which includes the whole of the city with considerable urban and more rural environs. Descriptions of the works of earlier botanists, David Ure, Thomas Hobkirk, Roger Hennedy and J. R. Lee in the area and the BSBI Atlas lead to details of how this latest survey was made. All plants were recorded in each of ninety 4km squares and in all some 1200 were found both native and alien. In mapping these a number of distribution patterns emerged which are described and maps given. The detailed presentation of these data is left for a future publication.

The following nine chapters are devoted each to a major habitat within the area. These are: Banks of the Clyde and Lochs; Canals; Railways and motorways; Rubbly waste ground; Bings and coups; Golf courses and heaths; Cemeteries and churchyards; Gardens; Woodlands and Wetlands, both fens and bogs. Each is described with history, distribution within the area, ecology and types of plants present followed by detailed descriptions of interesting plants found. Paintings illustrate groups of plants found in a named locality typical of each habitat. Further attractive paintings and photographs enhancing the text make up a substantial part of the volume.

A final chapter concerns changes in plants during the last 200 years. About 100 species have become extinct, the major causes being changing land uses, the spread of housing and industry, the making of canals, roads and railways and the modernisation of agriculture. A further 50 species have been re-found and several species of aliens are now an important part of the present flora. The conservation interest of the nine habitats is discussed describing the measures now being taken to prevent further losses and suggesting future action so that the human and wildlife inhabitants of Glasgow may both survive in harmony.

RUTH H. DOBSON

Alexander Patience and his Work on Woodlice (Crustacea; Isopoda) in the Clyde Area with a List of Recorded Species

E. G. HANCOCK

Art Gallery and Museum, Kelvingrove, Glasgow
G3 8AG.

Alexander Patience was a member of the Natural History Society of Glasgow for over thirty years. During this time he had a great interest in crustaceans in general. Only part of this period did he spend looking at woodlice but he made a significant impact on the subject as a whole as well as building up local records. He described several species new to science, which are still valid, as a lasting memorial to his efforts. Two species (*Chaetophiloscia patiencei* (Bagnall, 1908) and *Miktoniscus patiencei* Vandel, 1946) were named in his honour showing the regard of his fellow workers.

The recent publication of two books on woodlice has awakened interest in this group of animals at a national level (Sutton, 1972; Harding & Sutton, 1985). Within the Glasgow area this has been reflected in recording activity by other society members (Collis & Collis, 1976 & 1978), who acted as Scottish representatives for the recording scheme but no longer live here. The Scottish recorder is now Mr C. P. Rawcliffe covering principally the Lothian region (e.g. Rawcliffe, 1989).

In anticipation of building up more records for the Clyde area, a review of earlier work will be useful both to establish what species have hitherto been known to occur in the area and to discover any distributional trends. It will also indicate areas to visit and show that with certain provisos on earlier uncheckable identifications, the Clyde area is rich in species. That this became evident even in the early part of this century is due mainly to the work of Alexander Patience which is preserved in museum specimens, unpublished notes and published articles. A short account of his contribution to the study of woodlice seems relevant.

Alexander Patience

Despite the fact that Patience made a significant contribution to the study of the Crustacea, no general notice of his activities appears to have been published. Although he was an active member of the Natural History Society of Glasgow his death went unrecorded in the published proceedings. Piecing together biographical details has proved difficult and the results are rather sparse to date.

His address is given in both the Natural History Society of Glasgow and the Buteshire Natural History Society membership lists as 140 London Street, Glasgow, c/o Metcalf & Sons. This was a firm of property and insurance agents and valuers (sic), for whom he worked, initially as a clerk. In 1954 his name disappears from both the post office directories and the register of voters. His death probably occurred at this time. His private addresses are numerous as derived from the same sources. The earliest given are 2 Golfhill Terrace (Firpark Street, Denniston) in 1900 and 17 Kirkwood Street, Ibrox in December, 1902, a period when he was donating specimens to Glasgow Museum. He joined the Natural History Society of Glasgow in 1899 and his name appears last in the 1930 membership list. Subsequently, he sent a paper as a tribute to Sir John Murray (1841-1914), the oceanographer, communicated to the society by the then President, Prof. L. A. L. King. Although this event is referred to in the proceedings (13th March 1937) the substance of it was not published by the society.

He is listed also as a corresponding member of the Bute society from 1930 to 1945. He published through them an article on Crustacea (Patience, 1910) which although entitled Part 1 does not appear to have had a sequel. It contains no references to woodlice.

The publications of Patience concerning woodlice are closely grouped within a period of only two years as if his interest was short lived or other demands on his time caused it to be set aside. His first paper, read to the Glasgow Natural History Society in June, 1906, was not published until March, 1908. This article contains his own statement (Patience, 1908a) that he had devoted "the past few months in further studying the distribution" following the lead of the Clyde List (Scott, 1901). There are several other occasions on which Patience is recorded as having read papers to the society on the subject but only this one was printed. In the meantime four other papers (Patience, 1907a, b; 1908b, c) had been written and were printed or in press.

His interest in Crustacea in general was fairly wide though concentrated on marine species, on which he published mainly between 1900 and 1914. This predated any specific interest in woodlice. A substantial number of his books and journals, many of foreign coverage or origin were donated to Glasgow University and are currently shelved in the General Library or Zoology Department. These demonstrate his depth of interest in the Crustacea. Material collected and preserved by him is in both Glasgow Museum, Kelvingrove (donated in 1902 and 1907) and the University (donated 1910). One or two of the types of his species of woodlice are located in Glasgow and some are in The Natural History Museum, London (Ellis & Lincoln, 1975).

He later operated as the recorder for Crustacea for the Clyde Card Catalogue Committee, set up by L. A. L. King for the 1928 British Association meeting in Glasgow. These cards still exist and are stored at Kelvingrove. Another card index prepared by Patience is associated with the collection donated to Glasgow University which provides more useful local information. The specimens, cards and published records together show an extensive knowledge of the woodlice found in the Clyde area of nearly a century ago, due almost entirely to Patience's efforts.

Records

The following list is based on records for the area up to 1978. Where localities are simply named these are based on data from the various Patience sources as referred to above. They cover the years 1907-1911. Other records from before or after this period are included where relevant and are credited to the naturalists concerned. Introduced species known only from heated premises such as greenhouses are treated separately at the end. The nomenclature follows the checklist in Harding & Sutton (1985).

Ligia oceanica (Linnaeus). Common and widespread on rocky shores; Cumbrae, Girvan, Arran.

Haplophthalmus danicus Budde-Lund. Lanark; Fairlie, Ayrshire; Springburn, Glasgow.

H. mengei (Zaddach). Old Kilpatrick, Renfrewshire.

Trichoniscus pusillus Brandt. This is a common and widespread species although Patience listed it diligently throughout the Clyde area. This is probably because it is a small woodlouse which until then had generally been overlooked. It is now known to be the most abundant species in the surface layers of the soil in the British Isles (Sutton, 1972).

T. pygmaeus Sars. Lanark, Ayrshire coastal localities and Glasgow parks.

Trichoniscoides albidus (Budde-Lund). Lanark; Old Kilpatrick; Clyde coastal localities and Bute. According to the most recent assessment of distribution and habitat preference (Harding & Sutton, 1985), this species has been confused with *T. saeroeensis* (q.v.). There are no modern records for *albidus* for Scotland. Unfortunately older preserved museum material is generally unsuitable for identification of this difficult genus.

T. saeroeensis Lohmander. Patience did not know this species as it has only recently been distinguished as far as the British fauna is concerned. Its coastal distribution fits with most of his records of *albidus* (see above).

T. sarsi Patience. Patience himself described this species (1908c) based on careful examination of the pleopods of the males (the characteristics of which are the only reliable means of distinguishing between members of this genus). He recorded it from Lanark; Gourrock, Renfrewshire; Alexandra Park, Glasgow. Because of the severe difficulty of identifying specimens preserved in museums the older records, including these are not acceptable to the current distribution recording scheme. Modern field work is needed to reconfirm the existence of species in this genus.

Androniscus dentiger Verhoeff. A widespread species according to Patience (1908a) as more recently (Collis & Collis, 1976 & 1978). Earlier, however, it had only been noted once, from East Tarbert by Scott (1901) and not at all by Robertson (1888).

Oniscus asellus Linnaeus. This species is so common that Patience generalises by not mentioning any localities.

Philoscia muscorum Scopoli. Garelochhead, Dunbartonshire; Greenock, Renfrewshire; Cumbrae and Kilwinning, Ayrshire.

Platyarthrus hoffmannseggii Brandt. A record of Collinge (1917) from Helensburgh is not impossible but his identifications are suspect and unacceptable (Harding, 1977) to the recording scheme. As it is a blind, pigmentless species found only in ants' nests its presence should be relatively easy to demonstrate. It has been found recently in Fife, this being the only Scottish record given in Harding & Sutton (1985).

Porcellio dilatatus Brandt. Patience recorded this species extensively from the area but always in greenhouses or in association with horticulture such as is found in the Clyde valley. In the case of this woodlouse there does appear to be a general decline with reduction of habitat (Harding & Sutton, 1985). Tomato growing is now generally hydroponic and in near sterile conditions. Hothouses in both commercial situations and public parks were very much Patience's stamping grounds and he found them very productive. Collis & Collis (1978) found it in the Winter Gardens at the People's Palace, Glasgow Green.

P. laevis Latreille. Three specimens found by Patience during alteration to the Corporation Market, Market Street, Glasgow in 1911, recorded in his card index for the Clyde Fauna Catalogue Committee.

P. scaber Latreille. Common and widespread in both Patience's time and today.

Porcellio spinicornis Say. Patience recorded it widely in the Clyde area.

Porcellionides pruinosus (Brandt). Found by Patience in association with tomato houses in Lanarkshire and Ayrshire and hothouses in Glasgow.

[*Trachelipus rathkei* Brandt. This species (as *Porcellio ratzeburgi*) was recorded as from Dumbarton by Edney (1954) on the basis of Collinge records which have since proved to be based on erroneous identifications (Harding, 1977).]

Cylisticus convexus (De Geer). Widely distributed throughout the whole of the area including Argyll.

Armadillidium nasatum Budde-Lund. Botanic Gardens, Glasgow and the greenhouses of Lord Bute at Mountstuart on the island in 1907.

A. pulchellum (Zenker). Patience gives this as "uncommon" in his Clyde Fauna Catalogue entry but then only gives one record for Lanark, 1911, without further detail. As it is principally a calcicolous species this would accord with its habitat requirements.

A. vulgare (Latreille). Old records of Patience and Robertson (1888) are for the Clyde coast from Gourock south to Kilwinning. (More recent records from Harding & Sutton (1985) show several from the limestone areas of the Clyde valley upstream from Glasgow.)

Introduced species

Cordioniscus spinosus (Patience). In the greenhouses of Tollcross Park and Springburn Park (the type locality).

Styloniscus stebbingi (Patience). Alexandra Park, Glasgow (the type locality) and subsequently found by Patience widely in hothouses in the Clyde area including Lanark, Ayr, Gourock, Hawkhead Asylum, near Paisley and Uddingston.

The above records show the diligence of our predecessors in this society in investigating all aspects of natural history. David Robertson (1886) maintained that as far as publicity was concerned Scotland appeared to be free of woodlice. He hoped that despite the fact that

'their rather repulsive appearance offers little inducement for taking an interest in them, and, like many other objects of Natural History, they are often neglected because they are common; yet these Isopods, when closely examined will be found not wanting either in beauty or interest.'

His remarks seem no less apposite to the present day.

The current situation seems to be that we have historical records for some twenty-three species. This is out of a total British list of thirty-five and a further dozen or so aliens established or occasionally found in botanic gardens some of which have been found more recently in Glasgow.

Acknowledgments

Mr. Peter Davis of the Hancock Museum, Newcastle-upon-Tyne and Dr. Joan Ellis of the Natural History Museum, London helped with information on the existence of type material in their respective

institutions. Miss Margaret Reilly of the Hunterian Museum, Glasgow University provided access to Patience material in her care.

Appendix — list of species described by Patience and location of type specimens, where known.

Trichoniscoides sarsi Patience, 1908. Given the number of localities and numerous specimens he refers to in the description it seems odd that no preserved material matching the data has been identified in any of the museums.

Cordioniscus spinosus (Patience, 1907). Some specimens were donated to Glasgow Museum in 1907 but do not appear to exist today. Eight syntypes are preserved in The Natural History Museum, London.

Styloniscus stebbingi (Patience, 1907). Four syntypes Glasgow Museum; eleven in London.

Miktoniscus linearis (Patience, 1908). This species was described from specimens collected in Kew Gardens by R. S. Bagnall but no specimens are present in the Hancock Museum, Newcastle-upon-Tyne where his collection was donated.

References

- COLLINGE, W.E., 1917. The woodlice of Dunbartonshire. *Scott. Nat.* 82:295.
 COLLIS, G.M. & COLLIS, V.D., 1976. *Androniscus dentiger* Verhoeff. *Glasg. Nat.* 19:336.
 COLLIS, G.M. & COLLIS, V.D., 1978. Some recent records of woodlice (Slaters) with particular reference to the Clyde area. *Glasg. Nat.* 19: 385-9.
 EDNEY, E.B., 1954. *Synopses of the British fauna*. No 9. British woodlice. London, Linnean Society.
 ELLIS, J.P. & LINCOLN, R.J., 1975. Catalogue of the types of terrestrial isopods (Oniscoidea) in the collections of the British Museum (Natural History). *Bull. Br. Mus. nat. Hist. Zoology*. 28: 65-100.
 HARDING, P.T., 1977. A re-examination of the work of W.E. Collinge on woodlice from the British Isles. *J. Soc. Biblphy. nat. Hist.* 8(3): 286-315.
 HARDING, P.T. & SUTTON, S.L., 1985. *Woodlice in Britain and Ireland: distribution and habitat*. Biological Records Centre, Monkswood. 151pp.
 PATIENCE, A., 1907a. On a new British terrestrial isopod. *Ann. Scot. nat. Hist.*, April 1907: 85-8.
 PATIENCE, A., 1907b. On a new British terrestrial isopod. *J. Linn. Soc. (Zool.)* 30: 42-4.
 PATIENCE, A., 1908a. On some terrestrial isopods new to the Clyde faunal area and some notes on the distribution of the rarer species. *Proc. Trans. nat. Hist. Soc. Glasg.* 8(NS): 80-6.
 PATIENCE, A., 1908b. On a new British terrestrial isopod (*Trichoniscus linearis* sp. nov.). *Ann. mag. nat. hist.* 1 (8th series): 280-2.
 PATIENCE, A., 1908c. On *Trichoniscus albidus* (Budde-Lund) and *T. sarsi* Patience (nom. nov.). *Ann. mag. nat. hist.*, 2 (8th series): 84-8.
 PATIENCE, A., 1910. Carcinological notes — 1. *Trans. Buteshire nat. Hist. Soc.* 3. 69-79.

- RAWCLIFFE, C.P., 1989. Myriapod and Isopod survey of the Lothians. *Edinburgh Nat. Hist. Soc. Journal*. 1989: 18-20.
- ROBERTSON, D., 1886. (Exhibit of some oniscoids from Cumbræ). *Proc. Trans. nat. Hist. Soc. Glasg.* 1(NS): iii.
- ROBERTSON, D., 1888. A contribution towards a catalogue of the Amphipoda and Isopoda of the Firth of Clyde. *Proc. Trans. nat. Hist. Soc. Glasg.* 2(NS): 9-99.
- SCOTT, T. 1901. Crustacea, Isopoda. (In ELLIOTT, G.F.S. et al. *Fauna, Flora and Geology of the Clyde Area*. B.A. Handbook, Glasgow): 335-6.
- SUTTON, S.L., 1972. *Woodlice*. London. 142pp.

Book Review

Flora of the Outer Hebrides

R. J. PANKHURST and J. M. MULLIN

Natural History Museum Publications, 1991, 169 pages, black and white photographs, maps and tables.

Limpback, ISBN 0 565 01121 9, £19.95.

This is the first comprehensive account of the Outer Hebrides' flora and congratulations go to all concerned. Earlier floras were planned but frustrated by clash of personalities between would-be authors. A cloud over the information-gathering process lingered and the present authors have not hidden this as every chapter indicates.

Preface and Introduction are followed by Geography, Geology, Soils and Climate. These set the scene for two chapters particularly significant to the Outer Hebrides — the Arrival of Plants and the Communities Found. Historical Plant Exploration and Plant Lore follow and on p. 61 the Species Accounts commence. Many have Gaelic names which are noted.

In most recent Scottish floras the relative importance of herbarium, literature and field records have been tacitly placed in that order. In this flora the three grades of acceptability are SEEN to be operated. Briefly habitats are mentioned for common species, but fuller comment is made elsewhere especially if subspecies or varieties are involved. Identification tips are offered and useful keys displayed. The islands are divided into 29 "ZONES" delineating similar climate and habitats. The Outer Isles are unsuited for presentation by grid squares, so the "ZONES" may be the best compromise.

One is occasionally faced with a surprising absence, *Anemone nemorosa* for instance. This and others highlight the paucity of the flora, which a prominent botanist once expressed to me before I visited the islands. Later the paucity was clear but rare taxa such as *Carex maritima* compensated.

The appendices from p. 150 include Gazetteer, Bibliography etc. No index is provided, which may inconvenience those unfamiliar with family order. There is occasional difficulty in tracing the meaning of abbreviations etc. One final suggestion — admire the back cover — it will give the feeling of the terrain and make believable that the plants described can live in the Outer Hebrides. The price is considerable but an account clearly setting out approaches and results will be found.

A. A. SLACK

Book Review

Bird Migration

THOMAS ALERSTAN

Cambridge University Press, 1990. 420 pages, diagrams and maps.
Hardback, ISBN 0-521-32865-9, £55.

Bird migration is a truly epic phenomenon. How else can you describe the trials of a Manx Shearwater that was taken from its nest burrow on the Welsh island of Skokholm, flown 5000 km across the Atlantic to Boston, and which then managed to make its way home in only 12 days. Our sense of amazement at these journeys is heightened because we still do not really understand how birds are able to achieve these great feats of navigation. The problems of bird migration have stimulated a formidable number of scientific studies and it is a brave author who takes on the task of reviewing the recent literature. Thomas Alerstam has risen to this challenge magnificently and his book is an outstanding example of popular scientific writing.

The book starts with a brief review of the world's climate, wind systems, and vegetation zones. This is followed by nine chapters which take the birds of various habitats in turn, looking at the features of their summer and winter quarters and the way in which these influence movement patterns. This section is concluded by a discussion on the evolution of migratory behaviour. There is then a second section dealing with the migratory journey itself. This covers how fast and high birds fly, how they fuel their journeys, the influence of weather and wind systems and the dangers of the journey. The final section deals with how the birds navigate, covering the sun and star compasses, magnetic senses and other clues. This book will be read with pleasure by everyone with an interest in birds. It is a great pity that the price will deter most people from buying a copy.

DAVID C. HOUSTON

Audiotape Review

Beginning Birdsong (SN879)

Introduced by KEN JACKSON

Sounds Natural, Upper End, Fulbrook, Oxon. OX18 4BX.
(Tel. 099 382 2167) £5.50.

On this cassette Ken Jackson introduces a dozen of the commoner British birds giving each roughly four minutes of song and calls. They are compiled from the range of 50-plus Sounds Natural tapes. Starting with the Blackbird's song and calls, we then hear Mistle and Song Thrush allowing easy comparison and familiarisation with their differences and similarities. The Ayrshire Song Thrush also mimics Redshank and Oystercatcher. Throughout the tape are comments from various experts; Bruce Campbell on Mistle Thrush: "so bold and challenging — something of the quality of a blackbird but less fluty, less mellow".

This is an ideal tape for beginners in birdsong and it will refresh the memory of many more experienced birders too. It will open anybody's ears thereafter to the identification of many more birds and other creatures whether you find them for yourself or buy some of the many other Sounds Natural tapes. At £5.50 it is an excellent stocking filler for beginners of all ages.

KEITH COHEN

The Natural History of the Muck Islands, North Ebudes

8. Bryophytes of Muck

N. G. HODGETTS

Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough PE1 1JY.

This paper documents all the bryophytes found on the Isle of Muck during a week-long family holiday in March 1991. It cannot be considered a Flora, as no comprehensive or systematic investigation was carried out. However, sufficient of interest was found to make me think that it would be worth-while publishing the results. Previous papers on the bryophyte flora include those of Blackburn and Lobley (1939), who list species found in the Small Isles, and Lodge (1963a, b), who also deals with the Small Isles as a group, and whose papers were intended to form "the first part of a comprehensive investigation of the bryophyte flora of the Hebrides". Lodge's papers brought together all known previous information on the bryophytes of the Small Isles, as well as reporting the results of field work by the author. A history of the bryological exploration of the Small Isles was also given. Perhaps inevitably, all these papers have had a bias towards the Isle of Rum, where there is the greatest scope for variety in the bryophyte flora.

The Isle of Muck is the southernmost of the "Small Isles" group, lying south of Rum, south-west of Eigg and north of the Ardnamurchan peninsula. It is in vice-county 104, along with Skye, Rum, Canna, Eigg and neighbouring smaller islands and islets. It is 3.8km long and 2.3km wide, with an area of 514ha (from M.H.W.S. line). Two 10km grid lines intersect on Muck, so the island is divided between four grid squares, NM 37, 38, 47 and 48 (Fig. 1). The island is essentially basaltic in nature, but the geology is complicated by the presence of glacial deposits (which support the richest agricultural grassland), bands of tuff and gabbro, and dolerite intrusions. This means that there is a wide range of substrate and pH, often mixed in a fairly complicated way, and this is reflected in the bryophyte flora, with calcicole and calcifuge species often growing in close proximity.

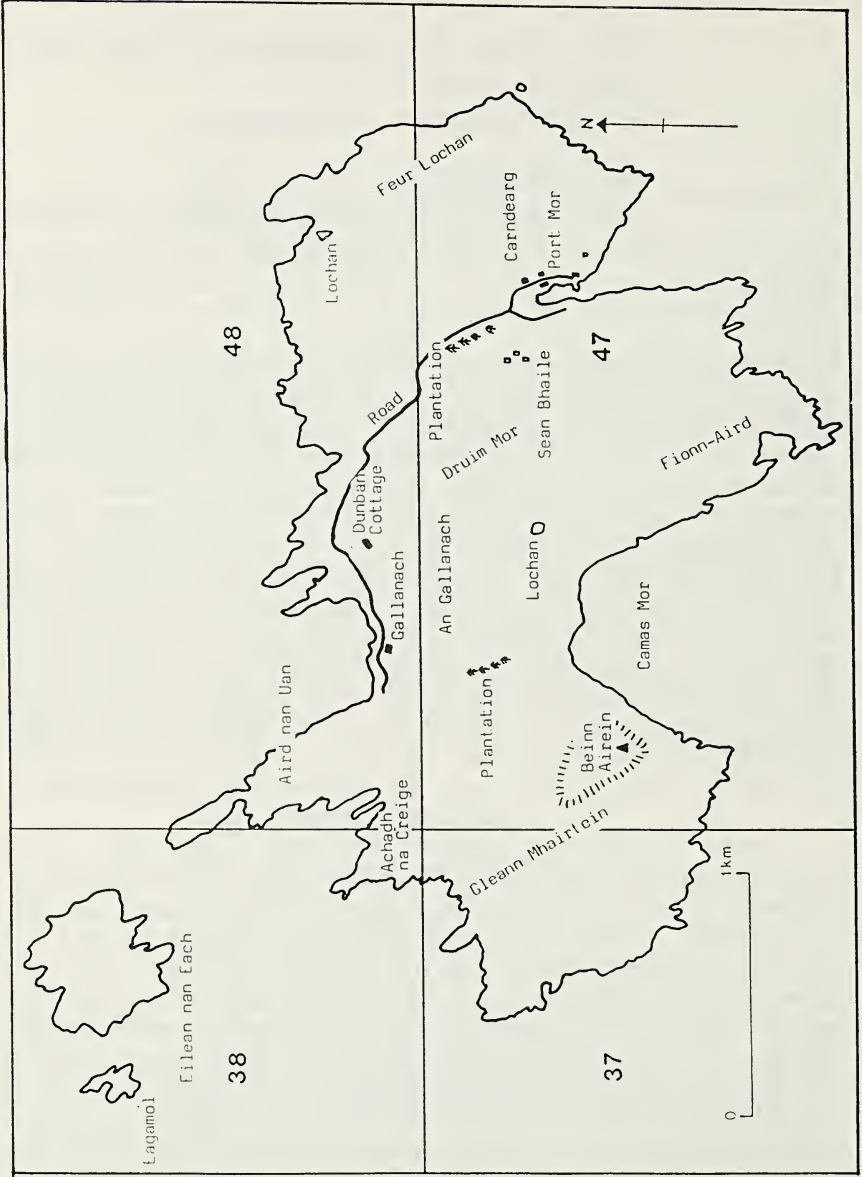


Fig. 1 The Isle of Muck, showing main areas examined for bryophytes.

Further details of the geography and geology of the islands are provided by Dobson & Dobson (1985), while MacEwen (1985) gives much general information on the history and economy of the island. Climate and vegetation are also described by Dobson & Dobson (1985).

Bryophyte Communities

The well-drained, species-poor *Agrostis-Festuca-Anthoxanthum* grassland that covers many of the low hills typically has a bryophyte community consisting mainly of *Pleurozium schreberi*, *Hylocomium splendens*, *Hypnum jutlandicum*, *Dicranum scoparium*, *Pseudoscleropodium purum* and *Rhytidiadelphus* spp. Where more sheltered, at the base of rocks for example, large liverworts such as *Tritomaria quinquedentata* appear, while on the rocks themselves there is usually a community of *Hypnum cupressiforme*, *Polytrichum* spp., *Racomitrium* spp., *Grimmia* spp., *Schistidium* spp., *Ptychomitrium polyphyllum*, *Frullania tamarisci* and *Scapania gracilis*, occasionally with *Andreaea* spp. *Fissidens cristatus*, *F. adianthoides* and *Plagiochila britannica* grew where the rock is more base-rich. *Plagiochila* spp., *Diplophyllum albicans* and *Lejeunea lamacerina* are found on more sheltered, damper rocks and on small crags in the grassland. Exposed thin soil over the top of rocks often has a community of *Campylopus* and *Polytrichum* spp. More sheltered rock outcrops, shaded by planted trees, often support additional species such as *Saccogyna viticulosa*, *Plagiochila killarniensis*, *P. spinulosa*, *Lejeunea patens* and *Metzgeria* spp.

Away from the central, dry grasslands, nearer the sea, the frequency of *Frullania teneriffae* on the rocks increases, and close to high water mark this species becomes common, along with *Schistidium maritimum*, *Trichostomum brachydontium*, *Ulota phyllantha*, and occasionally *Glypomitrium daviesii*, with *Weissia* spp. in the crevices. Sea cliffs have a similar flora, which can be quite varied, depending on the substrata available. The cliffs at Camas Mor are probably the richest on the island. Sometimes, particularly behind raised beaches, as at Aird nan Uan, low, well-irrigated and richly-vegetated cliffs occur. These often support mosses such as *Fissidens* spp. and the Hebridean speciality *Myurium hochstetteri*. The sea cave south of Fionn-ard has extensive colonies of *Cratoneuron filicinum*, *Eucladium verticillatum* and *Conocephalum conicum*. There is a slight development of sand dunes at Gallanach, with *Tortula ruralis* ssp. *ruralis* and *Brachythecium albicans*, though more typical dune species have been recorded there in the past.

The more acid ground of the "core basalt" on Beinn Airein supports an intricate mosaic of wet heath communities, with an abundance of

Hylocomium splendens, *Pleurozium schreberi* and *Sphagnum subnitens*, with *S. auriculatum* common in wetter areas. The crags on Beinn Airein are subjected to wetter conditions than elsewhere on the island, and support species such as *Saccogyna viticulosa*, *Isothecium myosuroides* var. *brachythecioides*, *Radula lindenberghiana* and *Lejeunea* spp. in their crevices. At the base of rocks on the north side of Beinn Airein, where shaded by *Calluna*, there is often a luxuriant development of communities of Lejeuneaceae, including *Harpalejeunea ovata* and *Colura calyptrifolia*. These small hepatics often spread onto the stems of *Calluna* and over *Frullania*. A feature of the eastern end of the island is the development of *Schoenus* mire in the Feur Lochan area, and this has a characteristic assemblage of "brown mosses" such as *Cratoneuron commutatum*, *Drepanocladus* spp., *Campylium stellatum* and *Scorpidium scorpioides*, as well as extensive *Sphagnum* cover. Bog vegetation has also developed around the margins of some of the lochans, with quite extensive "quaking" vegetation around the lochan south-west of An Gallanach plantation. The number of *Sphagnum* species on the island in general appears to be quite small, with *S. auriculatum* and *S. subnitens* by far the most common. *S. tenellum* and *S. cuspidatum* were not found at all.

There are no native areas of woodland but there are several plantations, including areas of *Eucalyptus* which do not look at all healthy, in spite of apparently good progress in 1985 (Dobson & Dobson, 1985). The ash and spruce plantation by the road between Port Mor and Gallanach has developed a reasonable woodland bryophyte flora, including epiphytic communities, but there is evidence that it has declined recently, perhaps because of the high grazing density. For example, *Bazzania trilobata* and *Lepidozia reptans*, found here by Lodge (1963b), were not refound, in spite of intensive searching. However, other woodland species such as *Mnium hornum* still grow here. The plantation at An Gallanach is quite different, being very swampy, humid and "closed". There is extensive growth of *Hookeria lucens* and *Plagiomnium undulatum* on the ground, with *Lejeunea ulicina* and *Cololejeunea minutissima* growing epiphytically.

Ephemeral habitats such as bare earth in the garden of Dunban Cottage were surprisingly interesting, with *Weissia rutilans*, *Pleuridium acuminatum*, *Riccia sorocarpa* and *Ditrichum cylindricum* all occurring.

Atlantic bryophytes, as defined by Ratcliffe (1968), are well represented on the island, particularly notable being *Glyphomitrium daviesii*, *Myurium hochstetteri* (both virtually confined to the Hedbrides in Britain and very restricted on a world scale), the southern atlantic *Marchesinia mackaii*, and the widespread atlantic liverworts *Frullania microphylla*, *Colura calyptrifolia*, *Harpalejeunea ovata*, *Plagiochila*

punctata and *Saccogyna viticulosa*.

Many of these species are very restricted in their international distribution, and the western islands and highlands of Scotland are of international importance for them.

The Species

Although no systematic survey was undertaken, a point was made of recording in all four 10km squares on the island. Unfortunately it was not possible to visit Eilean nan Each (Horse Island) or Eagamol, because of time and tides. Where a species was recorded more than three times during the week, only 10km squares are given. Fuller locality details are given if a species was recorded three or fewer times.

Nomenclature and taxonomic order are according to Corley and Hill (1981) for the mosses and Smith (1990) for the liverworts. Exceptions to this are *Andreaea*, revised by Murray (1988), and *Racomitrium* where the *R. canescens* and *R. heterostichum* complexes were revised by Frisvoll (1983, 1988), and British species subsequently treated by Hill (1984) and Blockeel (1991).

Some species found are considered "rare" or "scarce" in Britain. Rare species are defined as those recorded since 1950 in 15 or fewer 10km squares; scarce species are those recorded since 1950 in 16-100 10km squares (Hodgetts, in press).

Liverworts

Kurzia pauciflora (Dicks.) Grolle; rare but locally frequent, creeping through *Sphagnum* in *Schoenus* mires, Carndearg, 47, and Feur Lochan, 48.

Calypogeia fissa (L.) Raddi; frequent on sheltered wet soil amongst rocks, creeping through *Sphagnum* in bogs and wet heath, 37, 47, 48.

Calypogeia muellerana (Schiffn.) K. Muell; frequent amongst *Sphagnum* in *Schoenus* mire, wet heath and very wet quaking bog around lochans, 37, 47, 48.

Calypogeia arguta Nees & Mont. in Nees; occasional on soil in heavily shaded rock crevices in Gleann Mhairtein, 37, and on Beinn Airein, 47. New to Muck.

Cephalozia bicuspidata (L.) Dum.; rare, on damp peaty soil in Achadh na Creige, 38, with perianths, and on Beinn Airein, 47.

Odontoschisma sphagni (Dicks.) Dum.; locally frequent creeping amongst *Sphagnum* near summit of Beinn Airein, 47, and at Feur Lochan, 48.

Odontoschisma elongatum (Lindb.) Evans; on flushed peat in boggy ground by sea, Achadh na Creige, 38. New to Muck. The only other record from the Small Isles is by Marquand, from Rum, but this is unsubstantiated. Nationally scarce species.

Cephaloziella hampeana (Nees) Schiffin; rare, in rock crevices at Camas Mor, 47. New to Small Isles.

Lophozia ventricosa (Dicks.) Dum. var. *ventricosa*; apparently rare, found only on peaty soil in Gleann Mhairtein, 37.

Lophozia sudetica (Nees ex Hueb.) Grolle; rare, on peaty soil under *Calluna*, Gleann Mhairteín, 37. New to Small Isles.

Tritomaria quinquedentata (Huds.) Buch; occasional in Gleann Mhairteín, 37, in rocky grassland on Druim Mor and on heathy ground under *Calluna*, Beinn Airein, 47.

Nardia scalaris S. F. Gray; strangely rare, found only on bare, damp soil on vertical stream bank, N.E. of Beinn Airein, 47.

Mylia anomala (Hook.) S. F. Gray; rare, amongst *Sphagnum*, Feur Lochan, 48.

Marsupella emarginata (Ehrh.) Dum. var. *emarginata*; occasional on wet rocks at Camas Mor, 47, and near Dunban Cottage, 48.

Diplophyllum albicans (L.) Dum.; frequent, on damp acid soil and rocks, 47, 48; with perianths on Druim Mor.

Scapania undulata (L.) Dum.; rare, on dripping rocks on low cliff, Aird nan Uan, 48.

Scapania subalpina (Nees ex Lindenb.) Dum.; rare, in bare gravelly flush on Beinn Airein, 47. New to Small Isles.

Scapania gracilis Lindb.; frequent on dry rocks and in well-drained heathy grassland, 37, 47, 48.

Lophocolea bidentata (L.) Dum. var. *bidentata*; locally frequent on fallen tree-trunks and tree bases in An Gallanach plantation, 47.

Lophocolea bidentata var. *rivularis* (Raddi) Warnst.; frequent in damp heathy grassland and swampy ground in plantations, 37, 47, 48.

Chiloscyphus polyanthos (L.) Dum.; locally frequent in flushes on Beinn Airein, 47.

Saccogyna viticulosa (L.) Dum.; occasional on damp, sheltered rocks and in rock crevices, 37, 47, 48.

Plagiochila killarniensis Pears.; occasional, on sheltered rocks on Druim Mor, 47, near Dunban Cottage and at Aird nan Uan, 48. New to Small Isles.

Plagiochila porelloides (Torrey ex Nees) Lindenb.; frequent in rock crevices and at bases of rocks in dry grassland and *Calluna* heath, 37, 47, 48.

Plagiochila asplenioides (L. emend. Tayl.) Dum.; rare, on a bank in plantation by road, 47. New to Muck.

Plagiochila britannica Paton; rare, on rocks, in Gleann Mhairteín, 37 and near Dunban Cottage, 48. New to Small Isles. Nationally scarce species.

Plagiochila spinulosa (Dicks.) Dum.; occasional, on sheltered rocks, in Gleann Mhairteín, 37 and on Druim Mor, 47.

Plagiochila punctata Tayl.; rare, in rock crevices in low cliff, Aird nan Uan, 48. New to Muck.

Radula complanata (L.) Dum.; rare, on *Salix* in Gleann Mhairteín, 37, with perianths.

Radula lindenbergiana Gott. ex Hartm. f.; rare, on wet rocks on Beinn Airein, 47, and crags on north side of Druim Mor, 48. New to Muck.

Porella obtusata (Trev.) Trev.; occasional, on rocks, Druim Mor and east of Port Mor, 47, and near sea below Dunban Cottage, 48. New to Muck. Nationally scarce species.

Frullania teneriffae (Web.) Nees; frequent on exposed rocks, particularly near the sea, 47, 48.

Frullania tamarisci (L.) Dum.; common on rocks and plantation trees, 37, 38, 47, 48.

Frullania microphylla (Gott.) Pears.; frequent on rocks, particularly where shaded and damp, 38, 47, 48.

Frullania fragilifolia (Tayl.) Gott.; occasional on sheltered rocks and plantation trees, 37, 47, 48.

Frullania dilatata (L.) Dum.; rare, on trees in plantation by road and in An Gallanach plantation, with perianths, and on rocks on coastal cliff, Camas Mor, 47.

Harpalejeunea ovata (Hook.) Schiffn.; locally frequent at bases of rocks, where damp and shaded by *Calluna*, and on *Calluna* stems; often epiphytic on *Frullania*; also in rock crevices on cliffs; Gleann Mhairtein, 37 and on north side and near summit of Beinn Airein, 47. New to Small Isles.

Lejeunea cavifolia (Ehrh.) Lindb.; rare, on sheltered rock in Gleann Mhairtein, 37. New to Muck.

Lejeunea lamacerina (Steph.) Schiffn.; common on rocks in a variety of situations, 37, 38, 47, 48; with perianths on crags on north side of Druim Mor.

Lejeunea patens Lindb.; frequent, but usually in small quantity, on damp, shaded rocks; also on ash trees in plantation by road; 38, 47, 48; with perianths on rocks near Dunban Cottage. New to Muck.

Lejeunea ulicina (Tayl.) Gott.; rare at base of wet rocks sheltered by *Calluna* in Gleann Mhairtein, 37, and Achadh na Creige, 38; locally frequent on trees in An Gallanach plantation, 47. New to Small Isles.

Colura calyptrifolia (Hook.) Dum.; very locally frequent at base of rocks, where damp and shaded by *Calluna*, sometimes epiphytic on *Frullania*, in gully on north side of Beinn Airein, 47. New to Muck. Nationally scarce species.

Cololejeunea minutissima (Sm.) Schiffn.; occasional on trees in An Gallanach plantation, 47, with perianths. New to Small Isles. Nationally scarce species.

Marchesinia mackaii (Hook.) S. F. Gray; rare, deeply shaded rock crevice in sea cliff, Camas Mor, 47. New to Small Isles.

Pellia epiphylla (L.) Corda; occasional on muddy banks and wet soil, particularly in plantations and by streams, 38, 47.

Aneura pinguis (L.) Dum.; occasional in bogs, wet heath, flushes and by streams, 38, 47.

Riccardia multifida (L.) S. F. Gray; rare, on wet peaty soil on Beinn Airein, 47. New to Muck.

Riccardia chamedryfolia (With.) Grolle; occasional on wet peaty soil, in flushes and rock crevices, 37, 47, 48.

Metzgeria furcata (L.) Dum.; frequent on trees and shrubs on plantations and gardens; occasional on rocks in sheltered crevices at Camas Mor and on Beinn Airein, 47, 48.

Metzgeria conjugata Lindb.; occasional on sheltered rocks, especially in crevices or where sheltered by trees, 37, 38, 47, 48. New to Muck.

Conocephalum conicum (L.) Underw.; occasional on wet, shady rocks in cliffs and amongst boulders, Achadh na Creige, 38; Camas Mor and in sea cave S. of Fionnaird, where it is locally abundant, 47.

Reboulia hemisphaerica (L.) Raddi; rare and in small quantity in rock crevice in cliff, Achadh na Creige, 38, with male receptacles, and on soil in rocky crevice by road just below cemetery, 47, with female receptacles.

Riccia sorocarpa Bisch.; bare ground by shed behind Dunban Cottage, 48.

Taxa recorded (but not necessarily confirmed) by previous workers not seen during the week: *Blepharostoma trichophyllum*, *Lepidozia reptans*, *Bazzania trilobata*, *Barbilophozia barbata*, *Lophozia ventricosa* var. *silvicola*, *Gymnocolea inflata*, *Mylia taylori*, *Jungermannia exsertifolia* ssp. *cordifolia*, *J. sphaerocarpa*, *Nardia compressa*, *Lophocolea heterophylla*, *Fossombronia wondraczekii*, *Pellia endiviifolia*, *Blasia pusilla*, *Riccardia palmata*, *Metzgeria leptoneura*, *Lunularia cruciata*, *Preissia quadrata*, *Riccia glauca*.

Mosses

Sphagnum papillosum Lindb.; occasional, in flush in Gleann Mhairteín, 37, acid wet heath below Druim Mor, 47, and *Schoenus* mire in Feur Lochan area, 48.

Sphagnum palustre L.; occasional or locally frequent/abundant in flushes in Gleann Mhairteín, 37, in *Schoenus* mire north of Carndearg, 47, and at edge of Lochan Croidhean Araich, 48.

Sphagnum squarrosum Crome; rare, on quaking margin of lochan, S. W. of plantation and Druim Mor, 47. New to Muck.

Sphagnum capillifolium (Ehrh.) Hedw.; occasional, locally frequent in *Schoenus* mire at Carndearg, and in boggy ground near summit of Beinn Airein, 47; also in *Schoenus* mire in Feur Lochan area, 48.

Sphagnum subnitens Russ. & Warnst.; common in bogs and wet heaths, 37, 38, 47, 48; with capsules on Beinn Airein.

Sphagnum compactum DC.; rare, acid wet heath below Druim Mor, 47.

Sphagnum auriculatum Schimp. var. *auriculatum*; common in bogs, flushes and on wet heaths, 38, 47, 48. New to Muck.

Sphagnum auriculatum var. *inundatum* (Russ.) M. O. Hill; occasional in quaking edge of lochan S. W. of plantation and Druim Mor, 47, and in *Schoenus* mire, Feur Lochan, 48. New to Muck.

Sphagnum recurvum P. Beauv. var. *mucronatum* (Russ.) Warnst.; occasional in boggy lochan edges and in bogs, 38, 47, 48.

Andreaea rupestris Hedw. var. *rupestris*; occasional on dry rocks on Druim Mor, and on both dry and wet rocks on Beinn Airein, 47; always with capsules. New to Muck.

Andreaea rothii Web. & Mohr ssp. *falcata* (Schimp.) Lindb.; occasional, slightly more common than *A. rupestris*, and in similar habitats; rocks at Achadh na Creige, 38, dry rocks on Druim Mor and both dry and wet rocks on Beinn Airein, 47; always with capsules. New to Muck.

Polytrichum formosum Hedw.; rare, seen only in turf amongst rocks on Druim Mor, 47.

Polytrichum commune Hedw. var. *commune*; common in Gleann Mhairteín, 37; occasional in bog by lochan S. W. of plantation and Druim Mor, 47.

Polytrichum piliferum Hedw.; frequent, on thin, dry soil over rocks, 37, 38, 47, 48.

Polytrichum juniperinum Hedw.; frequent on dry rocks and dry soil amongst rocks, 37, 38, 47, 48; with capsules on Druim Mor and in Gleann Mhairteín.

Pogonatum aloides (Hedw.) P. Beauv. var. *aloides*; occasional, in plantation by road, 47, and on earthy banks at Dunban Cottage, 48; always with capsules.

Pogonatum urnigerum P. Beauv.; rare, on earthy banks at Dunban Cottage, 48.

Atrichum undulatum (Hedw.) P. Beauv. var. *undulatum*; rare, in rock crevice near Dunban Cottage, 48, with capsules. New to Muck.

Diphyscium foliosum (Hedw.) Mohr; rare, on steep shaded stream bank below Beinn Airein, 47. New to Muck.

Archidium alternifolium (Hedw.) Mitt.; on gravelly detritus by burn in Gleann Mhairteín, 37, with capsules. New to Muck.

Pleuridium acuminatum Lindb.; rare, on bare soil next to shed at Dunban Cottage, 48, with capsules. New to Small Isles.

Ditrichum cylindricum (Hedw.) Grout; rare, on bare soil in lawn of Dunban Cottage, 48. New to Small Isles.

Ditrichum heteromallum (Hedw.) Britt.; on steep, earthy bank by plantation next to road, 47. New to Muck.

Ceratodon purpureus (Hedw.) Brid. var. *purpureus*; frequent on bare ground, paths and occasionally rocks, 37, 47, 48; with capsules at Dunban Cottage.

Dichodontium pellucidum (Hedw.) Schimp.; rare, in gravelly detritus by stream in Gleann Mhairteín, 37. New to Muck.

Dicranella palustris (Dicks.) Crundw. ex Warb.; occasional at stream edges and flushes, Gleann Mhairteín, 37, and Beinn Airein, 47.

Dicranella heteromalla (Hedw.) Schimp.; strangely rare, but locally frequent on banks and tree bases in plantation by road, 47.

Dicranum majus Sm.; occasional on sheltered ground amongst rocks, 37, 47, 48. New to Muck.

Dicranum scoparium Hedw.; common in turf, heathland, on tree bases, rocks and in bogs, where it is frequently encountered as an undulate-leaved form which could be confused with other species of *Dicranum*; 37, 38, 47, 48.

Campylopus fragilis (Brid.) Br. Eur.; occasional on dry, thin soil over rocks, 47, 48.

Campylopus pyriformis (Schultz) Brid. var. *pyriformis*; occasional on bare peat, Gleann Mhairteín, 37, and east of Port Mor, 47. New to Muck.

Campylopus paradoxus Wils.; occasional on peaty soil, Gleann Mhairteín, 37, Achadh na Creige, 38, and Druim Mor, 47.

Campylopus atrovirens DeNot. var. *atrovirens*; frequent on wet rocks or rocks subjected to occasional water flow, 38, 47, 48.

Campylopus introflexus (Hedw.) Brid.; occasional on bare peat and peaty soil in wet heathland and on rotting wood, 47, 48; with capsules in An Gallanach plantation. New to Small Isles.

Campylopus brevipilus Br. Eur.; rare, on thin, peaty soil over rock, Camas Mor, 47. New to Muck.

Leucobryum glaucum (Hedw.) Angstr.; occasional on peat on Beinn Airein, 47.

Fissidens viridulus (Sw.) Wahlenb. sens. lat.; rare, on earth in deep rock crevices, Camas Mor, 47. New to Muck.

Fissidens bryoides Hedw.; occasional on bare earth in lawn and flowerbeds at Dunban Cottage, 48; with capsules.

Fissidens osmundoides Hedw.; occasional on dripping rocks on coastal cliffs, east of Port Mor, Cardearg area, 47, and Aird nan Uan, 48. New to Muck.

Fissidens taxifolius Hedw. var. *taxifolius*; rare, but locally frequent on a bank in Gleann Mhairteín, 37, and on bare earth in garden of Dunban Cottage, 48.

Fissidens taxifolius var. *pallidicaulis* (Mitt.) Moenk.; occasional in plantation by road, 47, and on rocks sheltered by planted trees and shrubs, near Dunban Cottage, 48. New to V.C.104. Nationally scarce variety, but its value as a taxon is questionable.

Fissidens cristatus Wils. ex Mitt.; occasional on base-rich rocks on Druim Mor, Camas Mor, and flushed rocks on Beinn Airein, 47. New to Muck.

Fissidens adianthoides Hedw.; occasional on wet base-rich rocks in Gleann Mhairteín, 37, east of Port Mor and on Beinn Airein, 47.

Tortula ruralis (Hedw.) Gaertn. ssp. *ruralis*; stabilized dunes at Gallanach, 48. New to Small Isles (though *T. ruralis* ssp. *ruraliformis* (DeNot.) Limpr. has been recorded here in the past).

Tortula muralis Hedw. var. *muralis*; found only on walls of Dunban Cottage, 48, with capsules, but almost certainly present on other buildings, which were not explored.

Pottia heimii (Hedw.) Fuernr.; rare, in soil-filled crevices in cliff, Cardearg, west of cave near Eilean Dubh, 47, and on peaty soil amongst rock just above high water mark on shore below Dunban Cottage, 48; always with capsules. New to Small Isles.

Barbula convoluta Hedw. var. *convoluta*; rare, on bare soil in garden of Dunban Cottage, 48. New to Muck.

Barbula unguiculata Hedw.; rare, on bare soil in garden of Dunban Cottage, 48. New to Muck.

Barbula cylindrica (Tayl.) Schimp.; rare, on bare soil in garden of Dunban Cottage, 48. New to Muck.

Barbula recurvirostra (Hedw.) Dix.; rare, in rock crevices on Beinn Airein, with capsules, 47.

Eucladium verticillatum (Brid.) Br. Eur.; locally abundant on wet, shaded walls of sea cave south of Fionn-aird, 47.

Weissia controversa Hedw. var. *controversa*; rare, on north-east facing crags on north side of Druim Mor, 48; with capsules. New to Muck.

Weissia perssonii Kindb.; occasional in rock crevices at Camas Mor, 47; with capsules. New to Small Isles. Nationally scarce species.

Weissia rutilans (Hedw.) Lindb.; rare, on bare ground in lawn and in flowerbeds at Dunban Cottage, 48; with capsules. New to V.C.104. Nationally scarce species.

Trichostomum crispulum Bruch; occasional on dry rocks at Achadh na Creige, 38, Camas Mor, 47, and near Dunban Cottage, 48.

Trichostomum brachydontium Bruch; frequent or common on rocks and in rock crevices, particularly on coastal cliffs, 37, 38, 47, 48; with capsules at Camas Mor.

Schistidium maritimum (Turn.) Br. Eur.; common on coastal rocks, 37, 38, 47, 48; usually with capsules.

Schistidium apocarpum (Hedw.) Br. Eur. var. *apocarpum*; frequent on walls and rocks, Camas Mor and Druim Mor, 47, Dunban Cottage, 48; usually with capsules.

Grimmia laevigata (Brid.) Brid.; rare, on exposed rocks on Druim Mor, 47. New to V.C.104. Nationally rare species, but may be under-recorded.

Grimmia affinis Hornsch.; occasional on dry exposed rocks on grassy hillsides, 37, 38, 47, 48; with capsules near Dunban Cottage. Nationally scarce species.

Grimmia pulvinata (Hedw.) Sm. var. *pulvinata*; frequent on walls, rocks and mortar, 47, 48; usually with capsules.

Grimmia trichophylla Grev. var. *trichophylla*; frequent on exposed rocks in Gleann Mhairtein, 37, on Druim Mor, 47, and near Dunban Cottage, 48.

Racomitrium ellipticum (Turn.) Br. Eur.; occasional in Gleann Mhairtein, with capsules, 37.

Racomitrium aciculare (Hedw.) Brid.; frequent on rocks and walls on Druim Mor and Beinn Airein, 47, and near Dunban Cottage, 48; usually with capsules.

Racomitrium aquaticum (Schräd.) Brid.; rare, on wet rock on low cliff above Sean Bhaile, 47. New to Muck.

Racomitrium fasciculare (Hedw.) Brid.; frequent on rocks and walls, 37, 38, 47, 48.

Racomitrium heterostichum (Hedw.) Brid. f. *heterostichum*; frequent on rocks and walls on Druim Mor and near An Gallanach plantation, 47, with capsules, and near Dunban Cottage, 48.

Racomitrium lanuginosum (Hedw.) Brid.; frequent in wet heath, Gleann Mhairtein, 37, on rocks on Druim Mor, 47, and in bogs, Feur Lochan, 48.

Racomitrium ericoides (Brid.) Brid.; occasional on dry, rocky ground, Camas Mor, 47, and on rocks by Lochan Criadhean Araich, 48. New to Small Isles.

Ptychomitrium polyphyllum (Sw.) Br. Eur.; common on dry rocks, 37, 38, 47, 48; usually with capsules.

Glypomitrium daviesii (With.) Brid.; occasional on rocks, especially near coast at Achadh na Creige, 38, on Beinn Airein, 47, and near Dunban Cottage, 48; always with capsules. New to Muck. Nationally scarce species.

Funaria hygrometrica Hedw.; rare, on bonfire site at Dunban Cottage, 48; with capsules.

Funaria attenuata (Dicks.) Lindb.; occasional in wet rock crevices on Beinn Airein, 47; with capsules.

Funaria obtusa (Hedw.) Lindb.; occasional on peat in wet heath, Carndearg, and on peaty banks on Beinn Airein, 47; both with capsules. New to Muck.

Pohlia nutans (Hedw.) Lindb.; occasional on earthy and peaty ground in heathland and acid grassland at Carndearg, 47, and near Dunban Cottage, 48, with capsules.

Pholia wahlenbergii (Web. & Mohr) Andrews var. *wahlenbergii*; rare, in sheltered rock crevices at Achadh na Creige, 38, and in low cliffs above Sean Bhaile, 47. New to Muck.

Anomobryum filiforme (Dicks.) Solms var. *filiforme*; rare, on gravelly detritus by burn, Gleann Mhairtein, 37. New to Muck.

Bryum capillare Hedw. var. *capillare*; frequent on rocks and walls, Druim Mor and Gleann Mhairtein, 37, and Dunban Cottage, 48, with capsules.

Bryum pseudotriquetrum (Hedw.) Schwaegr. sens. lat.; occasional in wet grassland, flushes and amongst wet rocks. Gleann Mhairtein, 37, Druim Mor and Carndearg area, 47.

Bryum alpinum Huds. ex With.; frequent in wet rock crevices, on wet rocks, and on gravelly soil by burn, 38, 47, 48.

Bryum bicolor Dicks.; locally common on and by the road, Port Mor, 47. New to Muck.

Bryum dunense Smith & Whitehouse; rare, on peaty soil in rock crevices just above high water mark, on coast below Dunban Cottage, 48. New to Small Isles. Nationally scarce species

Bryum argenteum Hedw. var. *argenteum*; occasional on bare ground and concrete, Port Mor, 47.

Bryum rubens Mitt.; rare, on bare patch in improved pasture. Cnoc nan Calman, Gallanach, 48. New to Small Isles.

Mnium hornum Hedw.; frequent in sheltered rock crevices, tree bases in plantations and turf in rocky grassland, 37, 38, 47, 48.

Plagiomnium undulatum (Hedw.) Kop.; locally frequent on shaded, swampy ground in An Gallanach plantation, 47.

Aulacomnium palustre (Hedw.) Schwaegr. var. *palustre*; frequent and locally common in bogs and wet heath, 37, 38, 47, 48; with capsules at the edge of lochan S. W. of Plantation and Druim Mor.

Philonotis fontana (Hedw.) Brid.; frequent in flushes, stream and lochan margins and wet bare ground in fields, 37, 47, 48.

Breutelia chrysocoma (Hedw.) Lindb.; occasional in Gleann Mhairtein, 37; frequent on wet ground under *Calluna*; Beinn Airein, 47, and on ungrazed grass amongst rocks shaded by trees near Dunban Cottage, 48.

Amphidium mougeotii (Br. Eur.) Schimp.; occasional on shaded, wet, vertical rocks and in crevices in cliffs, 37, 47, 48.

Orthotrichum anomalum Hedw.; rare, on rocks and walls on Druim Mor, 47, and at Dunban Cottage, 48; both with capsules. New to Muck.

Orthotrichum pulchellum Brunton; rare, on *Salix* in flush, Gleann Mhairtein, with capsules, 37. New to Muck.

Ulota crispa (Hedw.) Brid. var. *crispa*; occasional, on *Salix* in Gleann Mhairtein, 37, and on trees in An Gallanach plantation, 47; both with capsules.

Ulota phyllantha Brid.; frequent on plantation trees and native *Salix* shrubs, and on rocks by sea, 37, 38, 47, 48.

Hedwigia ciliata (Hedw.) P. Beauv.; occasional on usually shallowly-sloping surfaces on dry rocks, Gleann Mhairtein, 37, and Druim Mor, 47.

Pterogonium gracile (Hedw.) Sm.; frequent on dry, exposed rocks on Druim Mor, 47, and near Dunban Cottage, 48. New to Muck.

Myurium hochstetteri (Schimp.) Kindb.; locally frequent in wet rock crevices on N. E. facing crags on Beinn Airein, 47, and occasional in wet, grassy rock crevices on low coastal cliffs behind raised beach, Aird nan Uan, 48. Nationally scarce species.

Neckera complanata (Hedw.) Hueb.; rare, at shaded base of rock near Dunban Cottage, 48.

Thamnobryum alopecurum (Hedw.) Nieuwl.; occasional in rock crevices and among ruined walls of old village, Sean Bhaile, and in deeply shaded recesses in cliffs, Camas Mor, 47, and on shaded crags on north side of Druim Mor, 48. New to Muck.

Hookeria lucens (Hedw.) Sm.; occasional in flush, Gleann Mhairteín, 37, on deeply shaded swampy ground, An Gallanach plantation, 47, and in dripping cavities in low cliffs behind raised beach, Aird nan Uan, 48. New to Muck.

Heterocladium heteropterum (Bruch ex Schwaegr.) Br. Eur. var. *heteropterum*; occasional in shaded earthy rock crevices in plantation by road, and on shaded rock bases and in rock crevices, Beinn Airein, 47, and in crevices in crags on north side of Druim Mor, 48.

Thuidium tamariscinum (Hedw.) Br. Eur.; common in turf, heath, bog, plantations and rock crevices, 37, 38, 47, 48.

Cratoneuron filicinum (Hedw.) Spruce var. *filicinum*; occasional or locally common in wet ground, flushes and on walls of sea cave, 37, 47.

Cratoneuron commutatum (Hedw.) Roth var. *commutatum*; occasional in flushes east of Port Mor, Carndearg area, 47.

Campylium stellatum (Hedw.) J. Lane & C. Jens. var. *stellatum*; locally common in boggy ground close to high water mark, Achadh na Creige, 38, in flushes east of Port Mor, Carndearg area, 47, and in *Schoenus* mire, Feur Lochan, 48.

Amblystegium serpens (Hedw.) Br. Eur. var. *serpens*; rare, in rock crevice, Camas Mor, 47. New to Muck.

Drepanocladus fluitans (Hedw.) Warnst. var. *fluitans*; occasional, in flushes in Gleann Mhairteín, 37, and more or less submerged at margins of Lochan Croidhean Araich, 48.

Drepanocladus exannulatus (Br. Eur.) Warnst. var. *exannulatus*; rare, in quaking bog at margins of lochans S.W. of plantation and Druim Mor, 47. New to Muck.

Drepanocladus revolvens (Sw.) Warnst.; occasional in bogs and flushes, Achadh na Creige, 38, Druim Mor, and Beinn Airein, 47.

Scorpidium scorpioides (Hedw.) Limpr.; occasional in flushes below Druim Mor and on Beinn Airein, 47; locally abundant in *Schoenus* mire, Feur Lochan, 48.

Calliergon cuspidatum (Hedw.) Kindb.; frequent in turf, marshy ground at edges of lochans, wet ground by flushes and other wet or boggy areas, 37, 38, 47, 48.

Isothecium myurum Brid.; occasional on rocks in Gleann Mhairteín, 37, at Achadh na Creige, 38, and near Dunban Cottage, 48.

Isothecium myosuroides Brid. var. *myosuroides*; common on exposed and sheltered rocks and on trees in plantations, 37, 38, 47, 48.

Isothecium myosuroides var. *brachythecioides*; (Dix.) Braithw. occasional in rock crevices on Beinn Airein, 47. Nationally scarce variety.

Homalothecium sericeum (Hedw.) Br. Eur.; frequent on rocks and walls, 37, 47, 48.

Brachythecium albicans (Hedw.) Br. Eur.; occasional on stabilized dunes at An Gallanach, 48.

Brachythecium rutabulum (Hedw.) Br. Eur.; frequent in lawns, amongst leaf litter in plantations and on rocks and sand dunes, 47, 48.

Brachythecium rivulare Br. Eur.; frequent in flushes, west pasture and by streams, 37, 38, 47.

Brachythecium populeum (Hedw.) Br. Eur.; rare on rocks on north-east facing crags, north side of Druim Mor, 48. New to Muck.

Pseudoscleropodium purum (Hedw.) Fleisch.; frequent or common in dry turf and heath, 37, 38, 47, 48.

Rhynchostegium riparioides (Hedw.) C. Jens.; rare, in burn in Gleann Mhairteín, 37.

Eurhynchium striatum (Hedw.) Schimp.; occasional on banks in plantation by road, 47.

Eurhynchium praelongum (Hedw.) Br. Eur. var. *praelongum*; frequent or common in a variety of habitats; bare earth, rock crevices, tree bases, shaded ground in plantations, etc, 37, 38, 47, 48.

Plagiothecium succulentum (Wils.) Lindb.; occasional in rock crevices and on tree bases, in roadside plantation and in An Gallanach plantation, 47, and near Dunban Cottage, 48. New to Muck.

Plagiothecium nemorale (Mitt.) Jaeg.; rare, in deeply shaded recess of rocks at base of cliff, Camas Mor, 47. New to Muck.

Plagiothecium undulatum (Hedw.) Br. Eur.; rare, on damp peaty soil under *Calluna*, Beinn Airein, 47.

Isopterygium elegans (Brid.) Lindb.; on bank in plantation by road, 47. New to Muck.

Hypnum cupressiforme Hedw. var. *cupressiforme*; common on rocks, walls, trees and soil, 37, 38, 47, 48; with capsules at Dunban Cottage.

Hypnum cupressiforme var. *resupinatum* (Tayl.) Schimp.; occasional on rocks and trees, 37, 47, 48.

Hypnum cupressiforme var. *lacunosum* Brid.; frequent on dry calcareous rocks on Druim Mor and Camas Mor, 47, and near Dunban Cottage, 48. New to Muck.

Hypnum mammillatum (Brid.) Loeske; occasional on trees in An Gallanach plantation, 47. New to Small Isles. The plant recorded was *H. cupressiforme* "var. *filiforme*": no capsules were found.

Hypnum jutlandicum Holmen & Warnke; common on heathy ground under *Calluna* and in acid grassland, 37, 38, 47, 48.

Ctenidium molluscum (Hedw.) Mitt. var. *molluscum*; occasional on base rich rocks, in rock crevices and in flushes, 47, 48.

Rhytidiadelphus triquetrus (Hedw.) Warnst.; frequent in grassland and amongst rocks, 37, 38, 47, 48.

Rhytidiadelphus squarrosus (Hedw.) Warnst.; common in turf, especially sheep pasture, heath and wet ground, 37, 38, 47, 48.

Rhytidiadelphus loreus (Hedw.) Warnst.; occasional in sheltered turf on Druim Mor and on boggy ground by lochan S.W. of plantation and Druim Mor, 47, and at edge of Lochan Criadhean Araich, 48.

Pleurozium schreberi (Brid.) Mitt.; common in heathland and grassland, 37, 38, 47, 48.

Hylocomium splendens (Hedw.) Br. Eur.; common on soil under *Calluna*, in turf, wet heath and open plantations, 37, 38, 47, 48.

Taxa recorded (but not necessarily confirmed) by previous workers not seen during the week: *Sphagnum tenellum*, *S. cuspidatum*, *Tetraphis pellucida*, *Blindia acuta*, *Dicranoweisia cirrata*, *D. bonjeanii*, *Tortula ruralis* ssp. *ruraliformis*, *Pottia truncata*, *Barbula revoluta*, *B. rigidula*, *B. tophacea*, *Bryum pallens*, *B. inclinatum*, *Rhizomnium punctatum*, *Cratoneuron commutatum* var. *falcatum*, *Calliergon sarmentosum*, *Homalothecium lutescens*, *Brachythecium velutinum*, *Eurhynchium pumilum*, *E. swartzii* var. *swartzii*, *Plagiothecium curvifolium*.

Acknowledgments

I would like to thank Mr and Mrs L. MacEwen for permission to collect bryophytes and for their hospitality and interest. Thanks are also due to Dr A. J. E. Smith, who confirmed the identification of *Grimmia*

affinis. Finally I would like to thank my family for tolerating my botanical activities while on holiday on Muck.

References

- BLACKBURN, K. B. & LOBLEY, E. M., 1939. Some bryophytes of the Small Isles parish of Inverness-shire and of the Island of Soay. *Proc. Univ. Durham Phil. Soc.* 10: 130-140.
- BLOCKEEL, T. L., 1991. The *Racomitrium heterostichum* group in the British Isles. *Bull. Br. Bryol. Soc.* 58: 29-35.
- CORLEY, M. F. V. & HILL, M. O., 1981 *Distribution of bryophytes in the British Isles. A census catalogue of their occurrence in vice-counties*. British Bryological Society, Cardiff.
- DOBSON, R. H. & DOBSON, R. M., 1985. The Natural History of the Muck Islands, North Ebeudes. 1. Introduction and vegetation with a list of vascular plants. *Glasg. Nat.* 21: 13-38.
- FRISVOLL, A. A., 1983. A taxonomic revision of the *Racomitrium canescens* group (Bryophyta, Grimmiaceae). *Gunneria* 41: 1-181.
- FRISVOLL, A. A., 1988. A taxonomic revision of the *Racomitrium heterostichum* group (Bryophyta, Grimmiaceae) in North and Central America, North Africa, Europe and Asia. *Gunneria* 59: 1-289.
- HILL, M. O., 1984. *Racomitrium elongatum* Frisvoll in Britain and Ireland. *Bull. Br. Bryol. Soc.* 43: 21-25.
- HODGETTS, N. G. (in press) *Guidelines for the selection of biological SSSIs: non-vascular plants*. Joint Nature Conservation Committee, Peterborough.
- LODGE, E., 1963a. The bryophytes of the Small Isles parish of Inverness-shire. I. Sphagnaceae and Musci. *Nova Hedwigia*, 5: 117-148.
- LODGE, E., 1963b. The bryophytes of the Small Isles parish of Inverness-shire. II. Hepaticae. *Nova Hedwigia* 6: 57-65.
- MACEWEN, L., 1985. *A Guide to Eigg and Muck*. Fort William.
- MURRAY, B., 1988. The genus *Andreaea* in the British Isles. *J. Bryol.* 15: 1-17.
- RATCLIFFE, D. A., 1968. An ecological account of Atlantic bryophytes in the British Isles. *New Phytol.* 67: 365-439.
- SMITH, A. J. E., 1990. *The Liverworts of Britain and Ireland*. Cambridge University Press, Cambridge.

Obituary

BLODWEN LLOYD-BINNS MSc PhD DSc FLS

When according her a title, most of those who knew her before her appointment in Malawi referred to her as Doctor, while many more recent acquaintances used Professor. Whatever the title all agree that Blodwen Lloyd-Binns (BLB) was a gracious lady who enhanced, both educationally and socially, the Glasgow Natural History Society.

BLB, a member of the Society since 1934 and an honorary member since 1981, died in her 90th year on 22-8-91.

As a schoolgirl Blodwen Lloyd gained several scholarships, exhibitions and distinctions and subsequently at Aberystwyth gained a BSc Wales with First Class Honours in Botany. Two years later she obtained the Masters Degree.

She came to Glasgow in 1926 to the Botany Department of the Royal Technical College (RTC), now the University of Strathclyde, initially as Assistant Lecturer with promotion to Lecturer three years later. She taught Botany to the Pharmacology classes and Bacteriology to other students. To augment the lectures she produced a *Handbook of Botanical Drawings* in 1935 with, in 1949, a second edition which has subsequently been reprinted seven times. In addition to teaching she was involved in the work of the Department on fermentation and was concerned also with the Marine Biology Group at Millport. On one occasion she had leave of absence to study marine bacteria at the University of California. A thesis on Marine Bacteriology led to a PhD Glasgow.

During her professional career she published many scientific papers and was invited to address "Learned Bodies" on both sides of the Atlantic.

During the war she lectured in the Engineering Department of the College to those taking a training course for women supervisors, and from 1942-44 she was Woman Power Officer, West of Scotland

Manpower Board, with responsibility for the call-up of women liable under the National Service Acts. She was then seconded to the British Council in London where she was Secretary to the Science Department and responsible for running it in the absence of the Director.

She returned to the RTC in 1947 as Senior Lecturer in Biology. Shortly thereafter she "discovered" the Herbarium amassed by John Scouler, the first Professor of Natural History at the old Andersonian University. She set about putting the specimens in order and became an enthusiast of Scouler, frequently expressing the hope that someone would complete the biography which she had begun. Some years ago, knowing of this interest, Mr E. W. Curtis obtained for her cuttings of Scouler's Willow (*Salix scouleriana*) from Vancouver Botanic Gardens and on the 22nd of March 1988 by which time the willow had reached an appropriate stage, BLB was thrilled to plant it at a small ceremony in the Arboretum of the Glasgow Botanic Gardens.

In 1951 she made a voyage of 1000 miles up the Amazon in the cruise ship *Hilary*. At one stage the ship was immobilised for two weeks due to industrial action so she obtained permission from the Ship's Master to go ashore in order to investigate the flora and fauna. Such was her professional interest that she remained much longer than anticipated causing Captain James Binns considerable concern. However, as ever, she must have charmed her way out of the situation because they married some years later. BLB retired in 1962 at the age of 60 in order to spend more time with her husband but Captain Binns MN OBE died a few months later.

For a time thereafter she did part-time work on the Herbarium at the RTC but this did not keep her fully stretched, so at the age of 63 she applied for the post of Professor of Botany at the new University of Malawi. Initially she was informed that she was considered too old but was subsequently appointed for a year but remained in post for seven.

Her remit was to study plants of possible economic importance to the country. She translated the plant names into the Malawi language and compiled a dictionary.

BLB was vice-president of the Andersonian Naturalists of Glasgow in 1962-65, acting as Chairman on a number of occasions when the meetings were held at Strathclyde University. She gave a lecture to the Society in 1961 and had an article published in the 1962 and 1964 issues of the Glasgow Naturalist.



Professor Blodwen Lloyd-Binns with J. H. Dickson at the opening ceremony of the *Andersonian Naturalists' Society Centenary Exhibition* at the Glasgow Art Galleries and Museum, Kelvingrove, in August 1985.

Monochrome print by T. Norman Tait after a colour transparency by R. Sutcliffe.

On her retiral from Malawi she returned to Glasgow and in 1974 read a paper entitled "African Assignment" to the Society. Subsequent to that time she attended most of the Society meetings. At the time of the proposed change of name to that of the Glasgow Natural History Society, pressure was put on her by staff at Strathclyde University, previously the Royal Technical College and prior to that the Andersonian University, to resist the change out of regard for tradition. However in her own inimitable way she informed them that if the mother hen could change, then so could the chick. In fact, at the meeting at which the change was implemented, she made the formal proposal.

In December 1979 she proposed the toast at the dinner in honour of retiring President J. H. Dickson. In August 1985 she gave a speech formally opening the Andersonian Naturalists' Society Centenary Exhibition at the Glasgow Art Galleries and Museum.

Throughout this period she maintained a connection with Strathclyde University, rehabilitating the Herbarium. She was honoured by that University in 1984 being awarded an honorary DSc.

BLB was disappointed not to be able to attend the centenary dinner in 1985 held at and in conjunction with Strathclyde University having been admitted to hospital as the result of an accident. While there another patient complained bitterly to her that although she was a teacher, a young social worker who had come to assess her fitness to return home had been concerned as to whether or not she could boil an egg. BLB replied quietly with her coy smile: "She wanted to know if I could make tea — and I have a double Doctorate!"

It can now be revealed that she was the anonymous donor to the funds of the Society in 1976 and she has willed a substantial bequest to the Society. Her name will therefore remain familiar to future generations but the present membership will remember in particular a lady who radiated friendship and kindness, and who had the ability to make people feel important during conversations which were always knowledgeable, clear and stylish and frequently witty.

Acknowledgments

I am indebted to Hywel Lloyd (nephew) for supplying me with personal details and to Professor W. W. Fletcher for professional information.

PETER MACPHERSON

Insect Records from the West of Scotland in 1990

Compiled by E. G. HANCOCK

Art Gallery and Museum, Kelvingrove, Glasgow
G3 8AG.

In this list of records, specific names and reference numbers of Lepidoptera are as in Bradley, J.D. and Fletcher, D.S., 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*, Curwen Books, London. As entries are numbered family names have been omitted. Other insects are as in Kloet, G.S. and Hincks, W.D., 1964, (Small Orders and Hemiptera) and 1976 (Diptera and Siphonaptera).

LEPIDOPTERA

112. *Stigmella luteella* (Stt.), Caolas an Eilean, Isle of Coll, V.C.103, 22/8/90, mines on birch, KPB.

128. *Phylloporia bistrigella* (Haw.), Arinagour New Pier, Isle of Coll, V.C.103, 22/8/90, mines on birch, KPB.

129. *Incurvaria (?) pectinea* Haw., Caolas an Eilean, Isle of Coll, V.C.103, 22/8/90, cases collected but adults not reared through, new to Coll. KPB.

149. *Adela cuprella* (D. & S.), Kilninver, Loch Feochan, V.C.98, 13/5/90, several; Easdale, Isle of Seil, V.C.98, 13/5/90, several, all ICC.

301. *Parornix betulae* (Stt.), Oldhall, Renfrew, V.C.76, 26/7/90, JEM.

358. *Phyllonorycter froelichiella* (Zell.), Pollok, Glasgow, V.C.76, 5/10/90, JEM.

560. *Coleophora paripennella* Zell., Oldhall, Renfrew, V.C.76, 5/6/90, JEM.

708. *Agonopterix carduella* (Hubn.), Minard Point, Loch Feochan, V.C.98, 18/5/90, larvae in Scotch thistles, emerged July/early August, 1990, ICC; Carsaig, Isle of Mull, V.C.103, 24/6/90, larvae in Scotch and Melancholy thistles, emerged early August 1990, ICC.

714. *Agonopterix yeatiana* (Fabr.), Arinagour, Isle of Coll, V.C.103, 20/8/90, new to Coll, KPB.

817. *Scrobipalpa clintoni* Pov., Dunyvaig Castle, Isle of Islay, V.C.102, 12/9/90, pupae in *Rumex crispus* emerged April 1991, ICC.

856. *Anarsia spartiella* (Schr.), Johnstone, Renfrew, 28/6/90, JEM.

1008. *Philedone gerningana* (D. & S.), Flanders Moss, Thornhill, V.C.87, 2/8/90, ICC.

1031. *Eana penziana* (Thunb. & Bk), Portpatrick, V.C.74, 25/8/90, JEM.

1126. *Ancylis badiana* (D. & S.), Loch a' Mhill Aird, Isle of Coll, V.C.103, 17/8/90, larvae on *Trifolium pratense*, new to Coll, KPB.

1146. *Epinotia rubiginosana* (H.-S.), Flanders Moss, Thornhill, V.C.87, 31/5/90, ICC.

1176. *Epiblema trimaculana* (Haw.), Carsaig, Isle of Mull, V.C.103, 27/6/90, ICC.
 1178. *Epiblema roborana* (D. & S.), Gartlea, Loch Lomond, V.C.99, 26/7/90, ICC.
 1208. *Blastesthia posticana* (Zett.), Flanders Moss, Thornhill, V.C.87, 31/5/90, pupa emerged from cocoon, ICC.
 1239. *Pammene rhediella* (Cl.), Fruitlet Mining Tortrix, Paisley Moss, V.C.76, 4/5/90, JEM.
 1257. *Cydia nigricana* (Fab.), Pea Moth, Gartlea Loch Lomond, V.C.86, a few larvae in garden peas, emerged late June 1991, ICC.
 1286. *Dichrorampha sedatana* Busck, Johnstone, Renfrew, V.C.76, 14/6/90, JEM.
 1315. *Catoptria furcatellus* (Zett.), Beinn Chuirn, Cononish, V.C.88, 17/7/90, ICC.
 1358. *Evergestis pallidata* (Hufn.), Oldhall, Renfrew, V.C.76, 25/7/90, JEM.
 1497. *Amblyptilia acanthadactyla* (Hubn.), Caolas an Eilean, Isle of Coll, V.C.103, 24/8/90, new to Coll, KPB.
 1522. *Leioptilus tephradactyla* (Hubn.), Carsaig, Isle of Mull, V.C.103, 26/6/90, ICC.
 1553. *Anthocharis cardamines* (L.), Orange Tip, Drymen Square, V.C.86, 2/5/90, JM; Formakin, V.C.76, 29/4/90, W.McC; Eaglesham, V.C.76, 26/5/90, PBH; Glen Moss, Kilmacolm, V.C.76, PT.
 1555. *Callophrys rubi* (L.), Green Hairstreak, Ailsa Craig, V.C.76, 1/5/90, BZ.
 1557. *Quercusia quercus* (L.), Purple Hairstreak, Garscadden Wood, Glasgow, V.C.99, 1/8/90, CS.
 1590. *Vanessa atalanta* (L.), Red Admiral, several records, earliest, Chapelton, V.C.77, 16/6/90, EGH; Brae, Dunlop, V.C.75, 23/10/90, ERW; larvae on nettles, Kinloch, Rum, V.C.104, 25/6/90, KPB.
 1591. *Cynthia cardui* (L.), Painted Lady, Rockcliffe, V.C.73, 10/6/90, MNR; Auchencairn, V.C.73, 4/8/90 and 18/8/90, MNR; Tainish, V.C.101, 2/8/90, BDB; Ayr, V.C.75, Aug 1990, WA; Auchincruive, Ayr, V.C.75, larvae on thistles, 8/9/90, JT; Pollok Park, Glasgow, V.C.76, CS; Knockentiber, V.C.75, 15/9/90, RH.
 1597. *Inachis io* (L.), Peacock, Legbranock Burn, near Motherwell, V.C.77, end April 1990, KW.
 1615. *Lasiommata megera* (L.), The Wall, Portpatrick, V.C.74, 18/8/90, JEM; Dumbarton, V.C.99, 8/90, KF.
 1621. *Hipparchia semele* (L.), The Grayling, Portpatrick, V.C.74, 18/8/90, JEM; Carmyle, V.C.77, 23/7/90, CS.
 1740. *Epirrhoe galiiata* (D. & S.), Galium Carpet, Portpatrick, V.C.74, 24/8/90, JEM.
 1743. *Entephria flavicinctata* (Hubn.), Yellow-ringed Carpet, Rottenburn Bridge, V.C.76, 9/3/90, emerged from larva, JEM.
 1802. *Perizoma affinitatum* (Steph.), The Rivulet, Carsaig, Isle of Mull, V.C.103, 26/6/90, ICC.
 1860. *Chloroclystis rectangulata* (L.), Green Pug, Carsaig, Isle of Mull, V.C.103, 27/6/90, ICC.
 2078. *Nola confusalis* (H.-S.), Least Black Arches, Oldhall, Renfrew, V.C.76, 4/8/90, JEM.
 2422. *Herminia nemoralis* (Fab.) Small Fan Foot, Carsaig, Isle of Mull, V.C.103, 26/6/90, ICC.

DIPTERA

TIPULIDAE

- Prionocera turcica* (Fabr.), Loch na Leighe, Bute, V.C.100, 22/5/90, EGH.
Dicranota exclusa (Walker), Dunagoil, Bute, V.C.100, 22/5/90, EGH.

TABANIDAE

Haematopota crassicornis Wahlb., Rubha Glas, Arran, V.C.100, 2/6/90, EGH.

EMPIDIDAE

Clinocera nivalis (Zett.), Beinn Bhan, Wester Ross, V.C.105, 31/5/90, IMcG.

Rhamphomyia morio Zett., Beinn Bhan, Wester Ross, V.C.105, 31/5/90, IMcG.

R. obscura Zett., Easan Dorcha, Wester Ross, V.C.105, 21/6/90, IMcG.

DOLICHOPODIDAE

Chrysotus kowarzi Lund., Torrin, Skye & Lochalsh, V.C.104, 11/7/90, IMcG.

Syntormon zelleri (Loew), Dundonnell Woods, Wester Ross, V.C.105, 19/6/90, IMcG.

Thrycticus bellus Loew, Rubha Dunan, Wester Ross, V.C.105, 17/7/90, IMcG.

OTITIDAE

Homalocephala albitarsis Zett., Gairloch, Wester Ross, V.C.105, 27/7/90, IMcG.

CALLIPHORIDAE

Calliphora uralensis Vill., Rubha Dunan, Wester Ross, V.C.105, 17/7/90, IMcG.

Contributors: –

W. Allen (WA), B. D. Batty (BDB), K. P. Bland (KPB), I. C. Christie (ICC), K. Futter (KF), E. G. Hancock (EGH), P. B. Hardy (PBH), R. Henderson (RH), W. McCance (WMcC), Iain MacGowan (IMcG), M. MacLean (MM), John Mason (JM), John E. Morgan (JEM), M. N. Rankin (MNR), C. Stevenson (CS), J. Thomson (JT), P. Tait (PT), E. R. Watson (ERW), Keith Watson (KW), Bernard Zonfrillo (BZ).



A shot of Iain and Jane Christie taken near their home recently.

From a colour transparency by Keith Cohen.

Obituary

**IAIN COLIN CHRISTIE, BSc.
(1930 – 1991)**

Iain Christie, who died on 21st November 1991 at the age of 61 years was the only child of Mr and Mrs J. F. Christie.

A very distinguished field naturalist, his chief interest was in the Insecta, especially Lepidoptera, an interest he shared with his father. He was not, however, a narrow specialist, but had a wide knowledge of natural history: birds, mammals and plant life; indeed all nature interested him.

His life as a practical farmer meant that he was in the fields daily and had every opportunity to use his considerable powers of observation.

Between 1948 and 1953 he studied Agriculture at Glasgow University where he chose to specialise in Agricultural Zoology. His knowledge of natural history, unusually extensive in such a young person, quickly became evident to his tutors who recognised him as an exceptional student. In 1965 he was awarded the Degree of B.Sc. (Agric.) with first class honours in Agricultural Zoology. Undoubtedly he could have embarked thereafter on a distinguished career in scientific research but this he refused to contemplate. His true interests were in practical farming which would enable him to pursue his activities in natural history in the field.

It was not until 1978 that he became a member of the Glasgow Natural History Society, but he soon began to take a prominent part in its activities giving lectures, displaying notable specimens which he had found and participating in field work. Over the years he wrote notes and papers for *The Glasgow Naturalist*, the titles of which reflect his wide ranging interests – Cuckoo Bees near Loch Lomond, Weather and Insect Numbers, Grasshoppers on Coll, Green Winged Orchid on the Ayrshire Coast, etc.

In 1984 he instigated the annual series “Lepidoptera in the West of Scotland” which in 1988 widened its scope to become “Insect Records from the West of Scotland”. This latter series will be continued.

His latest paper was on “*Ledum* on Flanders Moss”, *Ledum* being a genus related to rhododendrons, plants for which he had a special liking. He planted numerous bushes in a small glen behind his farm

— they afforded him much pleasure in the flowering season.

Iain served as a member of the council of our society on two occasions 1980-82 and 1986-88. He was the Zoology Convener in 1983 and 1984.

His expertise was also valued by the Nature Conservancy Council for whom he and his daughter Elspeth wrote reports on the Moths and Butterflies of Gartlea, Dunbartonshire (1977) and Moths of East Loch Lomondside (1980 and 1982).

In all of his activities in both natural history and agriculture he was encouraged and helped by his wife Jane. She shared in full measure his interest in nature being especially knowledgeable about plants, and accompanied him to various places in the west of Scotland, including the Inner Hebrides. Both were very popular members of our society and attended meetings regularly whenever the pressure of farming life permitted. Of their family of one son and three daughters, two of their daughters have been active in postgraduate ecological research. To Jane and her family we express our deepest sympathy; Iain will be sorely missed by us all.

A. R. HILL

Introduction of another non-native Fish Species to Loch Lomond: Crucian Carp (*Carassius carassius* (L.)).

COLIN E. ADAMS¹ and JOHN MITCHELL²

¹University Field Station, Rowardennan, Glasgow G63 0AW.

²Nature Conservancy Council for Scotland,
22 Muirpark Way, Drymen, Glasgow G63 0DX.

On the 28th June 1991, during weed clearing operations, a single Crucian carp (*Carassius carassius* (L.)) (Plate 1) was caught in a small drainage channel, in the lower catchment of the River Endrick, in the south-west corner of Loch Lomond.

This channel, (N.G.R. NS 436 877) which is around 1.5m deep, 3m wide and approximately 250m in length, forms part of the internal drainage system of the Aber Bogs within the Loch Lomond National Nature Reserve. The channel's substrate is a soft silt and its margins are well vegetated with *Phalaris arundinacea* L. For a large part of the year a wooden dam prevents access by fish from the rest of the catchment. However, each winter, as the water level in Loch Lomond rises, the channel becomes directly connected with, and frequently completely submerged by, the swollen river and loch.

To look for further specimens of this species, the accessible parts of the channel were surveyed by electro-fishing on the 26th August 1991. As a result a second Crucian carp was collected (a third specimen was observed but escaped into deep water) as well as 2 Pike, *Esox lucius* (L.) and 5 Eels, *Anguilla anguilla* (L.).

The two Crucian carp specimens obtained from the ditch were 178 and 119mm long (fork-length), and weighed 128 and 34.5g; although it was not possible to ascertain the age of these specimens from scale readings, the size differences suggest that they represent more than one age class.

This is certainly the first record of this species from the Loch

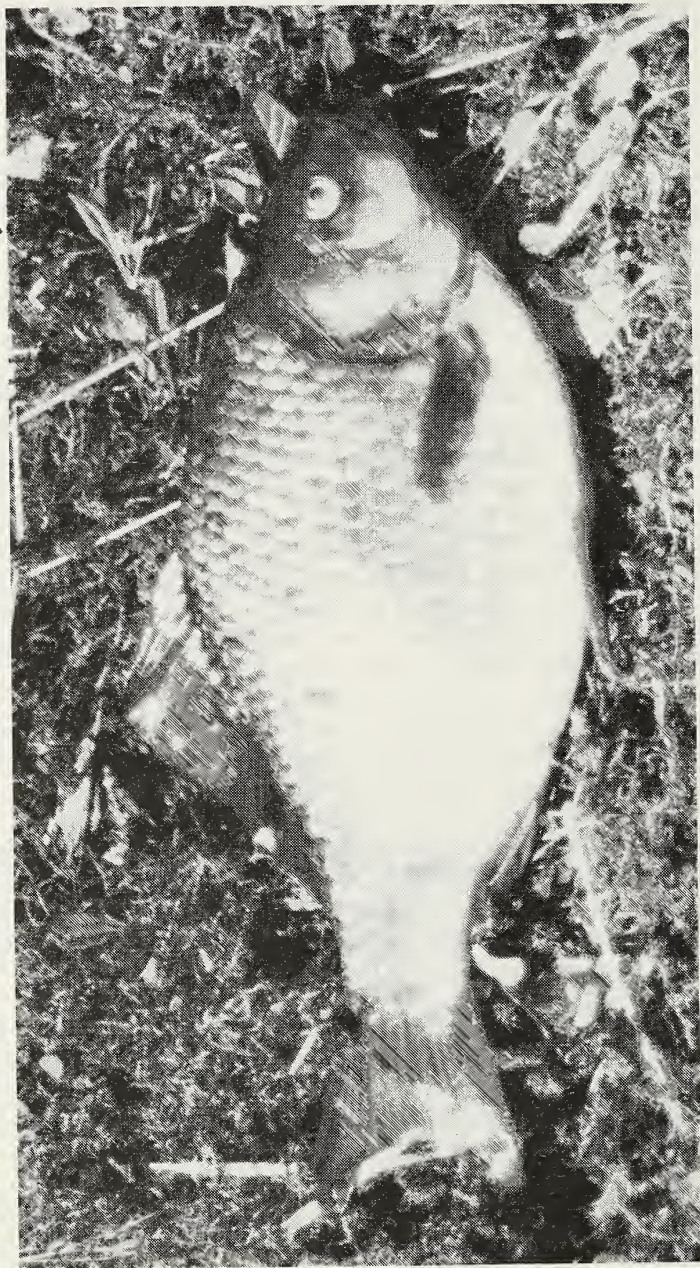


Plate 1. A Crucian carp *Carassius carassius* (L.) specimen, a new introduction to Loch Lomond.

Lomond catchment and although it is a relatively common ornamental pond species, this is apparently the first authenticated record of a wild specimen from Scotland (Maitland, 1972; Wheeler, 1969).

The rapid establishment of at least four populations of fish species previously unknown from the Loch Lomond catchment have been reported within the last decade (Maitland, *et al.*, 1983; Maitland, 1987; Adams *et al.*, 1991) and there is evidence of others (Adams and Maitland, 1991). Of these, both Ruffe (*Gymnocephalus cernuus* (L.)) and Dace (*Leuciscus leuciscus* (L.)) have been highly successful in colonising Loch Lomond. These species are now numerically abundant (in the case of Ruffe, extremely so) and have increased their geographical range within the catchment.

The introduction of new species to Loch Lomond has mostly been blamed on the release of pike live baits acquired from more southern catchments. This has even been recognised by anglers themselves (see e.g. Carnell, 1987). It is likely that the species reported here arrived in Loch Lomond by the same route, as Crucian carp have been used as a live bait by pike anglers for some years (Ralston MacPherson & Stuart Little, pers. comm.).

The status of this species in Loch Lomond is still unclear. However, the presence of more than one age class suggests that either there has been more than one invasion by this species over a number of years, or that there is a viable breeding population there. According to Phillips and Rix (1985) unlike other carps, Crucian carp are capable of spawning at relatively low temperatures, suggesting that natural spawning of this species in Loch Lomond may be possible.

Although the effects of these new species on the ecology of Loch Lomond are not yet fully understood, it is clear that the indiscriminate introduction of other non-native species has had significant impact on the ecology of Loch Lomond (see e.g. Adams, 1991; Adams and Tippet, 1991).

Acknowledgments

Our thanks to Messrs. Duncan Brown, Neil Fraser, Donald Muir and Carmen Placido for assistance in collecting the specimens reported here.

References

- ADAMS, C. E., 1991. Shift in pike, *Esox lucius* L. predation pressure following the introduction of ruffe, *Gymnocephalus cernuus* (L.) to Loch Lomond. *J. Fish Biol.* 38: 663-667.
- ADAMS, C. E., BROWN, D. W. and TIPPETT, R., 1990. Dace (*Leuciscus leuciscus* (L.) and Chub (*Leuciscus cephalus* (L.): New introductions to the Loch Lomond catchment. *Glasg. Nat.* 21: 509-513.
- ADAMS, C. E. and MAITLAND, P. S., 1991. Evidence of further invasions of Loch Lomond by non-native fish species with the discovery of a roach X bream *Rutilus rutilus* (L.) x *Abramis brama* (L.), hybrid. *J. Fish Biol.* 38: 961-963.
- ADAMS, C. E. and TIPPETT, R., 1991. Powan ova *Coregonus lavaretus* (L.) predation by newly introduced ruffe *Gymnocephalus cernuus* (L.) in Loch Lomond, Scotland. *Aqua. Fish. Mgmt.* 22: 261-267.
- CARNELL, D., 1983. Pike baits have fled the loch. *Anglers Mail* 3 October, 1983.
- MAITLAND, P. S., 1972. *A Key to the Freshwater Fishes of the British Isles*. F. B. A. Scientific Publication No. 27, Ambleside.
- MAITLAND, P. S., 1987. *Fish translocations and introductions – their impact in the British Isles*. In: *Angling and Wildlife in Freshwaters* (Eds P. S. Maitland & A. K. Turner). I. T. E. Symposium No. 19, Grange-over-Sands, Cumbria.
- MAITLAND, P. S., EAST, K. and MORRIS, K. H., 1983. Ruffe *Gymnocephalus cernua* (L.) new to Scotland in Loch Lomond. *Scott. Nat.* 7-9.
- PHILLIPS, R. and RIX, M., 1985. *Freshwater Fish of Britain, Ireland and Europe*. Pan, London.
- WHEELER, A., 1969. *The Fishes of the British Isles and North-West Europe*. MacMillan, London.

Some Records of Terrestrial Invertebrates from Rum National Nature Reserve 1990

Compiled by E. G. HANCOCK

Art Gallery and Museum, Kelvingrove, Glasgow
G3 8AG.

The records delineated here are the results of a week's intensive field work during the Scottish Entomologists' 10th annual field meeting. This was held on the island nature reserve at the invitation of the Nature Conservancy Council for Scotland. The principal aim apart from the generation of new records was to establish any changes in the populations of insects since the publication of an extensive list (Wormell, 1982). This earlier work preceded a period of new management practices including the control of domesticated animal stocks and the planting of trees, within fenced areas where necessary. Comments on any specific effect on the fauna are referred to within the text or summarised at the end. All records originated during the week 25th-29th June, 1990 and specific days are not quoted for the sake of brevity. Such detail is contained within the original lists which are housed in Glasgow Art Gallery and Museum. Similarly, six-figure Ordnance Survey national grid references are available for most of the individual sites which are listed from the nearest identifiable names on the 1:50,000 map.

A few records are included from 1989, contained in the Rhum (sic) Wildlife Report, which are based on the field notes of the late W. Nelson.

The list of Diptera which resulted from this same field meeting is being published separately. Other orders are missing because no attempt was made to collect them.

In this list the specific names for the Lepidoptera are as in Bradley & Fletcher (1979), other insects as in Kloet & Hincks (1964, 1977, 1978) and spiders follow the checklist in Roberts (1987).

Asterisks preceding species names indicate records apparently new to Rum. A quantitative summary of the results is given in Table 1.

Table 1 Summary table of insect records.

	Recorded, 1990	Wormell, 1982 (British list)	New to list
Dermaptera	1	1 (7)	0
Odonata	9	10 (45)	0
Orthoptera	2	4 (30)	0
Hemiptera (Heteroptera)	13	82 (516)	3
Homoptera (excl. aphids)	18	67 (350)	4
Aphids	2	82 (526)	2
Caddisflies (excludes WN 1989 records)	18	43 (192)	3
Lepidoptera	141	500 (2495)	25
Coleoptera	136	523 (3729)	14
Hymenoptera (Aculeata)	10	30 (554)	5
Siphonaptera	1	8 (57)	0
	<hr/>	<hr/>	<hr/>
	Totals 349	1351 (8501)	56
	<hr/>	<hr/>	<hr/>

Species recorded

INSECTA

DERMAPTERA

Forficula auricularia L., Harris, RK.

ODONATA

COENAGRIIDAE

Pyrrhosoma nymphula (Sulzer), Kinloch, Glen Shellesder, Mullach Mor, Harris, EMS; Monadh Mhiltich, RK.

Ischnura elegans (v. d. Linden), Harris, WN & EMS.

Enallagma cyathigerum (Charp.), Kinloch, Glen Shellesder, Mullach Mor, Harris, EMS.

LESTIDAE

Lestes sponsa (Hansemann), Kinloch, WN & EMS.

CORDULEGASTERIDAE

Cordulegaster boltoni (Don.), Glen Shellesder, EMS; Kilmory Glen, AG & RK; Coire Dubh, Dibidil, Allt na Ba, Kinloch, Sgaorishal, Monadh Mhiltich, Abhainn Fiachanis, WN.

AESCHNIDAE

Aeshna juncea (L.), Kinloch, Mullach Mor, Loch Gainmhich, EMS.

LIBELLULIDAE

Libellula quadrimaculata L., Kinloch, Glen Shellesder, Mullach Mor, Harris, EMS; Loch a Ghille Reamhra, RK; Loch nan Eala, AG; Loch Fiachanis, Salisbury's Dam, WN.

Sympetrum danae (Sulzer), Kinloch, WN & EMS. (This species was formerly known as *scoticum* (Donovan))

S. striolatum (Charpentier) or *nigrescens* Lucas, Harris, EMS. (These two species intergrade within their range in Scotland).

ORTHOPTERA

TETRIGIDAE

Tetrix undulata (Sowerby), Papadil, DH; Harris, KB.

ACRIDIDAE

Myrmeleotettix maculatus (Thunb.), Kilmory dunes, EGH.

HEMIPTERA/HETEROPTERA

MIRIDAE

**Psallus varians* (H.-S.), Kilmory plantation, PW.

Chlamydatus wilkinsoni (Doug. & Scott), Coire Dubh, RK; Fionchra, DH.

**Plagiognathus chrysanthemi* (Wolff), Harris, RK.

Pithanus maerkeli (H.-S.), Harris, Monadh Mhiltich, RK.

Calocoris roseomaculatus (Degeer), Harris, RK.

C. norvegicus (Gmelin), Harris, RK.

Teratocoris saundersi (Doug. & Scott), Harris, RK.

Leptoterna ferrugata (Fallen), Harris, RK.

SALDIDAE

Salda morio Zett., Hallival, Orval, RK; Glen Shellesder, DH.

**S. littoralis* (L.), Kinloch, DH & RK.

Saldula scotica (Curtis), Monadh Mhiltich, RK.

S. palustris (Douglas), Kinloch, DH.

**Teloleuca pellucens* (Fab.), Hallival, RK.

VELIIDAE

Velia caprai Tamanini, Loch Iain, RK.

GERRIDAE

Gerris costai (H.-S.), Coire nan Grundd, RK.

CORIXIDAE

Sigara nigrolineata (Fieber), Hallival, Orval, Coire nan Grundd, RK.

HEMIPTERA/HOMOPTERA

CERCOPIDAE

Philaenus spumarius (L.), Kilmory plantation, PW.

Neophilaenus lineatus (L.), Harris, Monadh Mhiltich, Coire Dubh, RK.

CICADELLIDAE

Ulopa reticulata (Fab.), Monadh Mhiltich, RK.

Oncopsis flavicollis (L.), Kilmory plantation, PW.

Aphrodes bifasciatus (L.), Harris, Monadh Mhiltich, RK; Bagh na h- Uamha, EGH.

Deltocephalus pulicaris (Fallen), Harris, RK.

**Jassargus distinguendus* (Flor), Harris, RK.

Diplocolenus abdominalis (Fab.), Harris, RK.

Psammotettix confinus (Dahlbom), Harris, RK.

**P. frigidus* (Boheman), Coire Dubh, RK.

P. nodosus (Ribaut), Harris, RK.

**Macrosteles ossianilssoni* Lindberg, Harris, RK.

M. horvathi Wagner, Harris, RK.

**Notus flavipennis* (Zett.), Harris, RK.

Eupteryx notata Curtis, Harris, Monadh Mhiltich, RK.

CIXIIDAE

Cixius cambricus China, Hallival, RK & DH.

C. nervosus (L.), Orval, RK; Kilmory plantation, PW.

DELPHACIDAE

Javesella forcipata (Boheman), Harris, Monadh Mhiltich, RK.

CALLAPHIDIDAE

**Phyllaphis fagi* (L.), on *Fagus*, Kinloch, GER.

APHIDIDAE

**Hyalopterus pruni* (Geoffroy), Kinloch (on *Prunus*), GER.

Although both of these aphids are common on the mainland they were unrecorded during previous surveys.

NEUROPTERA

SIALIDAE

Sialis lutaria (L.), Loch Papadil, RK.

TRICHOPTERA

RHYACOPHILIDAE

Rhyacophila dorsalis (Curtis), Kilmory (adults swept from grasses and rushes around river and dune slack), MS.

GLOSSOSOMATIDAE

Glossosoma boltoni Curt., Kilmory, WN.

HYDROPTILIDAE

Hydroptilia forcipata (Eaton), Bagh na h-Uamha (adult), EGH.

PHILOPOTAMIDAE

Philopotamus montanus (Donovan), Loch Papadil (adults swept from *Juncus*), MS.

POLYCENTROPIDAE

Plectrocnemia conspersa (Curt.), Mullach Mor, Kilmory, WN.

Polycentropus flavomaculatus (Pict.), Kilmory (adults swept), Loch Dudh am Sgoir (larvae), MS.

Holocentropus dubius (Ramb.), Loch Iain (adults swept), MS.

Cyrnus trimaculatus (Curt.), Loch Papadil (larvae), Loch Iain (adults swept), MS.

PSYCHOMYIIDAE

Tinodes waeneri (L.), Kilmory (adults swept), MS.

HYDROPSYCHIDAE

**Hydropsyche pellucida* (Curt.), Kinloch (adults), MS.

PHRYGAENIDAE

Phryganea bipunctata Retz., Mullach Mor, WN. (Previously known as *P. striata* (L.))

Agrypnia obsoleta (Hagen), Priomh-lochs (larvae), MS.

A. varia (Fab.), Loch Iain (adults swept); Glen Harris, AG; lochans near Minishal (adult), MS.

LIMNEPHILIDAE

Limnephilus marmoratus Curt., Loch nan Eala (adults swept), MS.

L. affinis Curt., Kinloch, Kilmory, WN.

L. auricula Curt., Kinloch, WN.

**L. binotatus* Curt., River Kinloch, MS.

L. centralis Curt., Kilmory Bay, AG.

L. elegans Curt., Kinloch, WN; Kilmory Fank, AG.

**L. griseus* (L.), Kinloch, WN.

L. ignavus McLachlan, Kilmory, WN.

L. luridus Curt., Kinloch, Kilmory, WN.

L. sparsus Curt., Kilmory (adults), MS.

L. coenus Curt., Kilmory (adults), MS.

Micropterna lateralis Stein, Kinloch, WN.

BERAEIDAE

Beraea maurus (Curt.), Kilmory (adult), MS.

LEPTOCERIDAE

Athripsodes aterrimus (Steph.), Loch Dudh am Sgoir (larvae & adults), MS.

**Ceraclea fulva* (Rambur), Kilmory, WN.

Mystacides azurea (L.), Loch Papadil (adult), MS.

Trienodes bicolor (Curt.), lochans near Minishal (adult), MS.

SERICOSTOMATIDAE

Sericostoma personatum (Spence), Kilmory (adult), MS.

Lepidostoma hirtum Rambur, Kilmory, WN.

LEPIDOPTERA

MICROPTERIGIDAE

Micropterix aruncella (Scop.), Kinloch, KB; Harris, KB & RP.

HEPIALIDAE

Hepialus hecta (L.), Kinloch, KB & RP.

NEPTICULIDAE

Stigmella sorbi (Stt.), Harris enclosure (leaf mines on rowan), KB; Kilmory encl., KB & RP.

**S. svenssoni* (Johan.), Kilmory Fank encl. (two pairs adults on oak) (genitalia checked by KB), PW.

S. lapponica (Wocke), Kinloch (leaf mines on birch), KB.

INCURVARIIDAE

Phylloporia bistrigella (Haw.), Kinloch (leaf mines on birch), KB & RP.

Incurvaria praelatella (D. & S.), Kinloch, KB & RP.

HELIOZELIDAE

Heliozela resplendella (Stt.), Kinloch, KB & PW.

ZYGAENIDAE

Zygaena filipendulae (L.), Kinloch, RP; Papadil, RS, PW & RK; Harris, KB & RP; Glen Duain, PW.

Z. purpuralis (Brunn.), Papadil, PW, RK & RS; Inbhir Ghil, PW.

TINEIDAE

Monopis rusticella (Hb.), Kilmory encl., KB & RP.

LYONETIDAE

Bucculatrix demaryella (Dup.), Kinloch, KB; Kilmory Fank encl., KB.

GRACILLARIIDAE

Caloptilia elongella (L.), Kinloch (workings on alder), KB & RP; Kilmory Fank encl., KB.

C. betulicola (Her.), Kinloch Glen (workings on birch), KB.

C. alchimiella (Scop.), Harris & Kilmory Fank encls., KB.

C. syringella (Fabr.), Kinloch, Harris encl., KB & RP; Kilmory Fank encl., KB & PW.

Aspilapteryx tringipella (Zell.), Harris, KB.

Parornix scoticella (Stt.), Harris encl., KB.

**Phyllonorycter quercifoliella* (Zell.), Kilmory encl. (reared from leaf mines on oak), KB.

P. spinolella (Dup.), Kinloch Glen (adult about sawfly), KB; Kilmory encl., RP.

P. alnifoliella auct., Kinloch and Kilmory Fank encls. (reared from leaf mines on alder), KB.

CHOREUTIDAE

Anthophila fabriciana (L.), Kinloch, Kilmory machair, KB & RP.

GLYPHIPTERYGIDAE

Glyphipterix simplicella (Steph.), Kinloch (one on *Dactylis glomerata*), KB.

G. thrasonella (Scop.), Kilmory machair, Kilmory encl., Harris, KB & RP; Kinloch, Glen Dìbidil, Glen Harris, Kilmory Fank, KB; Kinloch Glen, PW.

YPONOMEUTIDAE

Argyresthia brockeella (Hb.), Harris & Kilmory Fank encls., KB; south side of Loch Scresort, PW.

A. goedartella (L.), Kinloch, RP; Harris encl., KB; south side of Loch Scresort, PW.

**A. pygmaeella* (Hb.), Kinloch Glen (several beaten from sawfly), KB & RP.

**A. sorbiella* (Treit.), Kilmory Fank encl., KB.

A. retinella (Zell.), Kinloch, Harris encl., KB.

A. conjugella (Zell.), Harris & Kilmory encls., KB; south side of Loch Scresort, PW.

**Swammerdamia caesiella* (Hb.), Kinloch Glen (beaten from birch), KB.

**Prays fraxinella* (Bjerk.), Harris encl., KB; Kinloch, KB & RP. (Typical white form).

EPERMENIIDAE

Epermenia chaerophyllella (Goeze), Kilmory machair (larvae on *Angelica sylvestris*), KB & RP.

COLEOPHORIDAE

Coleophora serratella (L.), Kinloch, Kilmory Fank encl., KB.

**C. pyrrhulipennella* (Zell.), Harris (two adults, genitalia checked), KB.

**C. albicosta* (Haw.), Kinloch, Harris & Kilmory encls. (around gorse), KB & RP.

**C. discordella* Zell., Harris, Glen Dibidil, Kilmory machair (cases on *Lotus corniculatus*), KB & RP.

C. taeniipennella (H.-S.), south of Kinloch, KB.

C. alticolella (Zell.), Kinloch, Harris, KB & RP.

ELACHISTIDAE

Elachista albifrontella (Hb.), Kinloch, KB & RP; Harris & Kilmory Fank encls., KB.

**E. subnigrella* Dougl., Harris (genitalia checked), KB.

E. pulchella (Haw.), Harris, KB & RP.

E. argentella (Cl.), Kinloch, KB; Harris & Kilmory Fank encls., KB & PW; Kilmory machair, KB & RP.

OECOPHORIDAE

Hoffmannophila pseudospretella (Stt.), Kinloch, RP.

Pleurota bicostella (Cl.), Dibidil, KB.

Depressaria daucella (D. & S.), Kinloch (larvae on *Oenanthe*), KB & RP. (This species is hereby confirmed for the island).

Agonopterix nervosa (Haw.), Kilmory Fank encl., KB.

GELECHIIDAE

**Monochroa tenebrella* (Hb.), Harris, RP.

Teleoides proximella (Hb.), Harris & Kilmory Fank encls., KB & PW.

Bryotropha terrella (D. & S.), Harris, KB & RP; Kilmory encl., RP.

B. politella (Stt.), Glen Dibidil, KB.

Neofaculta ericetella (Hb.), Kinloch, KB & RP; Kilmory Fank encl., Dibidil, Harris, KB.

Scrobipalpa samadensis plantaginella (Stt.), Kinloch, Glen Dibidil, KB; Harris, KB & RP; Kilmory machair, RP.

S. artemisiella (Treit.), Harris, Kilmory machair, KB & RP.

S. acuminatella (Sirc.), Harris (leaf mines in thistle), KB; Kilmory machair, KB & RP.

Caryocolum marmoreum (Haw.), Kilmory machair, KB, RP & EGH.

**Aproaerema anthyllidella* (Hb.), Harris (larval workings in *Anthyllis* and two adults), KB.

MOMPHIDAE

**Mompha raschkiella* (Zell.), Kilmory Fank encl., (adult about rosebay willowherb), KB.

SCYTHRIDIDAE

Scythris picaepennis (Haw.), Harris, KB.

COCHYLIDAE

**Stenodes straminea* (Haw.), Harris, KB & RP.

Aethes hartmanniana (Cl.), Harris, KB.

**A. piercei* Obraz., Harris (two adults), RP.

**A. smeathmanniana* (Fabr.), Kinloch (one adult), KB.

Eupoecilia angustana (Hb.), Kinloch, KB.

TORTRICIDAE

Pandemis cerasana (Hb.), Harris and Kilmory Fank encls., KB; Kilmory Burnside encl., PW.

Syndemis musculana (Hb.), Kilmory Fank encl., KB.

Aphelia viburnana (D. & S.), Dibidil, KB; Harris, KB & RP.

**A. paleana* (Hb.), Kinloch, Harris encl., KB; Kilmory Fank encl., PW; Harris, KB & RP; Bagh na h-Uamha, EGH.

Acleris sparsana (D. & S.), Kinloch (reared from larvae on sycamore), RP.

A. variegana (D. & S.), Kilmory (reared from larvae on rowan), KB.

A. hastiana (L.), near Kinloch (reared from larvae on *Salix repens*), KB.

Olethreutes schulziana (Fabr.), Glen Dibidil, Kilmory Fank encl., KB.

O. lacunana (D. & S.), Kinloch, Glen Dibidil, Glen Harris, Kilmory Fank and Harris encls., KB; Harris, RP.

**Hedya nubiferana* (Haw.), Kilmory Fank encl. (one adult), KB; Kilmory (two emerged from pupae on bramble), KB & RP.

Lobesia littoralis (H. & W.), Kilmory machair, RP.

**Bactra furfurana* (Haw.), Kinloch, KB.

B. lancealana (Hb.), Kinloch, Harris, Kilmory encl., KB & RP; Dibidil, Kilmory machair, KB.

Ancyli badiana (D. & S.), Kinloch, Harris, Kilmory, Kilmory Fank and Harris encls., KB & RP.

**Epinotia subocellana* (Don.), Kilmory Fank encl. and Kinloch Glen (adults about saw), KB & PW.

E. immundana (F. von R.), Kinloch (reared from larvae on alder), KB.

E. tenerana (D. & S.), Kinloch, Kilmory Fank encl., KB.

E. cruciana (L.), Kinloch, KB.

E. mercuriana (Froel.), Kilmory machair, KB & RP.

Epiblema cynosbatella (L.), Kilmory Fank encl., Kilmory machair, KB.

E. scutulana f. *cirsiana* (Zell.), Kinloch, KB (This species hereby confirmed for the island, genitalia checked).

Eucosma cana (Haw.), Kilmory machair, KB & RP.

Pammene regiana (Zell.), Kinloch, KB.

**Cydia tenebrosana* (Dup.), Kilmory Fank encl. (adults around oak sapling), KB; south side of Loch Scresort, PW.

C. succedana (D. & S.), Kinloch, KB; Kilmory encl., KB & RP.

Dichrorampha montanana (Dup.), Kinloch, KB & RP.

ALUCITIDAE

Alucita hexadactyla (L.), Kilmory encl. (larvae reared from honeysuckle), KB & RP.

PYRALIDAE

Chrysoteuchia culmella (L.), Kinloch, Kilmory Fank, KB & RP.

Crambus nemorella (Hb.), Glen Dibidil, Glen Harris, Kilmory and Kilmory Fank encls., KB.

C. perlellus (Scop.), Harris and Harris encl., KB & RP; Kilmory, PW.

Agriphila straminella (D. & S.), Kinloch, Harris, KB & RP.

Scoparia ambigualis (Treit), Kinloch, Glen Dibidil, Glen Harris, KB; Kilmory and Harris encls., KB, RP & PW.

Eudonia angustea (Curt.), Kilmory (reared from larvae in moss on rock face), KB.

Opsibotys fuscalis (D. & S.), Glen Dibidil, Glen Harris, Kilmory Fank, KB; Harris, Kilmory machair, KB & RP.

Udea uliginosalis (Steph.), Bealach an Oir, KB.

PTEROPHORIDAE

Platyptilia isodactylus (Zell.), Kinloch, KB.

Stenoptilia bipunctidactyla (Scop.), Kinloch, KB & RP.

Pterophorus tridactyla (L.), Harris, KB & RP.

PIERIDAE

Pieris napi (L.), Kinloch, KB; Papadil, RK.

LYCAENIDAE

Polyommatus icarus (Rott.), Kinloch, Glen Harris, Harris encl., KB; Harris, Kilmory machair, Kilmory, KB & RP; Papadil, RK.

NYMPHALIDAE

Vanessa atalanta (L.), Kinloch (larvae on nettles), KB.

Boloria selene (D. & S.), Harris RP; Kilmory Fank encl., KB; Kinloch Glen, PW; Papadil, RK; Kilmory encl., RP & PW.

Argynnis aglaja (L.), Papadil, RK.

SATYRIDAE

Hipparchia semele (L.), Harris, KB & RP; Papadil, RK.

Maniola jurtina (L.), Kinloch, Glen Harris, Harris and Kilmory encls., KB; Harris, KB & RP; Kilmory machair, RP & PW; Papadil, RK.

Coenonympha pamphilus (L.), Kinloch, Glen Dibidil, Glen Harris, Kilmory Fank encl., KB; Harris, KB & RP; Papadil, RK.

C. tullia (Muell.), Harris, RP; Ard Nev, RK; Kilmory KB, RP & EGH; Bagh na h-Uamha, EGH; Kinloch Glen, PW.

LASIOCAMPIDAE

Lasiocampa quercus callunae Palm., Kinloch, RP; Dibidil, Kilmory Fank, KB; Harris, KB & RP.

Macrothylacia rubi (L.), Harris, KB & RP.

Philudoria potatoria (L.), slopes above An Uamh, KB.

SATURNIDAE

Saturnia pavonia (L.), Glen Harris, Kilmory Fank encl., KB.

THYATIRIDAE

Ochroplaca duplaris (L.), Kilmory Fank encl., PW.

GEOMETRIDAE

Scopula ternata (Schr.), Kinloch, Dibidil, Kilmory Fank and Kilmory encls., KB & RP.

Xanthorhoe designata (Hufn.), Kilmory Burnside encl. PW.

X. montana (D. & S.), Kinloch, Glen Dibidil, Glen Harris, KB; Kilmory, Kilmory Fank and Harris encls., KB, RP & PW.

Camptogramma bilineata (L.), Glen Harris, Harris encl., KB; Glen Duain, PW; Harris, Kilmory machair, KB & RP.

Cosmorhoe ocellata (L.), Harris, KB & RP.

Chloroclysta truncata (Hufn.), Kinloch, KB; Kilmory encl. and machair, KB, RP & PW.

- Thera obeliscata* (Hb.), Harris encl., KB.
Colostygia pectinataria (Knoch.), Kilmory encl., KB & RP.
Electrophaes corylata (Thunb.), Kilmory Fank, PW.
Perizoma minorata (Treit.), Glen Dibidil, KB.
P. blandiata (D. & S.), Kinloch, RP; Harris, KB & RP; Kilmory encl., PW.
Eupithecia nanata (Hb.), Kilmory Fank, PW.
E. satyrata (Hb.), Kinloch, KB & RP.
E. distinctaria (H.-S.), Harris, KB & RP.
E. vulgata (Haw.), Kilmory Fank encl., PW.
Aplocera plagiata (L.), Harris (adults and reared from larvae on *Hypericum pulchrum*), KB & RP; Kilmory machair, RP.
Abraxas grossulariata (L.), Kilmory encl. and machair, KB & RP.
Lomaspilis marginata (L.), Kinloch, RP; Kilmory Fank encl., KB & PW.
Opisthograptis luteolata (L.), Harris and Kilmory Fank encl., KB.
Lycia zonaria (D. & S.), Harris, Kilmory machair, KB & RP.
Biston betularia (L.), Kinloch, RP.
Agriopis aurantiaria (Hb.), Kilmory Fank encl. (larvae on alder), KB.
Bupalus piniaria (L.), Kilmory encl., PW.
Cabera pusaria (L.), Harris and Kilmory Fank encls., KB & PW.
C. exanthemata (Scop.), Kilmory Fank and Burnside encls., PW.
Campaea margaritata (L.), Kilmory Fank and Burnside encls., PW.
Hylaea fasciaria (L.), Kilmory Fank encl., PW.

SPHINGIDAE

- Laothoe populi* (L.), Kilmory Burnside encl., PW.

NOTODONTIDAE

- Phalera bucephala* (L.), Kilmory Burnside encl., PW.
Furcula furcula (Cl.), Kinloch, RP; Kilmory Burnside encl., PW.
Notodonta dromedarius (L.), Kilmory Fank and Burnside encls., PW.
Pheosia gnoma (Fabr.), Kilmory Burnside encl., PW.
Ptilodon capucina (L.), Kilmory Fank encl., PW.

NOCTUIDAE

- Agrotis exclamationis* (L.), Kilmory Fank encl., PW.
Ochroleura plecta (L.), Kilmory Fank encl., PW.
Noctua pronuba (L.), Kilmory Fank encl., PW.
Lycophotia porphyrea (D. & S.), Kilmory Fank and Burnside encls., PW.
Lacanobia oleracea (L.), Kinloch tree nursery, PW.
Ceramica pisi (L.), Kilmory Burnside encl., PW.
Mythimna impura (Hb.), Kilmory Burnside encl., PW.
Cucullia umbratica (L.), Kilmory encl., RP.
Antitype chi (L.), Harris (reared from larvae on thistle and *Plantago lanceolana*); Kilmory encl. (larvae on foxglove), KB & RP.
Euplexia lucipara (L.), Kilmory Fank encl., PW.
Phlogophora meticulosa (L.), Kilmory Fank encl., JS.
Apamea monoglypha (Hufn.), Kilmory Fank encl., PW.
A. crenata (Hufn.), Kilmory Burnside encl., PW.
Autographa gamma (L.), Harris, KB & RP.
Abrostola triplasia (L.), Kinloch, RP & PW.
Phytometra viridaria (Cl.), Glen Harris, KB.
Rivula sericealis (Scop.), Kinloch, KB & RP.
Hypena proboscidalis (L.), Kinloch, KB.

COLEOPTERA

CARABIDAE

- Cychrus caraboides* (L.), Coire Dubh, RK.
Carabus glabratus Paykull, Kinloch, AG; Kilmory, AG & RK.
C. granulatus L., Bloodstone Hill, RK.
C. problematicus Herbst, Orval, RK.
Leistus rufescens (Fab.), Kilmory, AG; Orval, RK.
Nebria gyllenhali (Schoenherr), Glen Harris, AG; Hallival, AG & RK; Coire Dubh, Orval, Coire nan Grundd, RK.
N. brevicollis (Fab.), Kinloch, RK.
N. salina Fairm. & Lab., Harris, AG; Orval, RK.
Notiophilus substriatus Waterhouse, Hallival, AG.
N. germinyi Fauvel, Orval, Hallival, RK.
N. biguttatus (Fab.), Hallival, RK.
Loricera pilicornis (Fab.), Hallival, RK.
Clivina fossor (L.), Hallival, AG & RK; Orval, RK.
Miscodera arctica (Paykull), Askival, DH.
**Patrobus septentrionalis* (Dejean), Askival, DH.
P. assimilis Chaudoir, Hallival, Orval, RK.
Trechus obtusus Erichson, Glen Harris, AG; Hallival, AG & RK; Coire Dubh, Orval, Allt Mor nan Hamha, RK.
Bembidion bipunctatum (L.), Hallival, AG.
B. lampros (Herbst), Harris Bay, AG.
B. tetracolum Say., Kinloch, AG & RK.
Pterostichus madidus (Fab.), Harris, AG & RK; Kinloch, RK.
**P. aethiops* (Panzer), Orval, RK.
P. diligens (Sturm), Coire nan Grundd, RK.
P. melanarius (Illiger), Kilmory, AG.
P. niger (Schaller), Kilmory, AG; Kinloch, Coire nan Grundd, Allt Mor nan Hamha, RK.
P. strenuus (Panzer), Roanopol, Kinloch, RK.
Abax parallelepipedus (Pill. & Mitt.), Kinloch, Kilmory, AG; Orval, Kinloch Glen, Allt Mor nan Hamha.
Calathus fuscipes (Goeze), Harris, AG & RK.
C. melanocephalus (L.), Glen Harris, AG & RK; Monadh Mhiltich, RK.
C. mollis (Marsham), Kilmory, AG.
Olisthopus rotundatus (Paykull), Hallival, Askival, Orval, RK.
Agonum fuliginosum (Panzer), Kilmory, AG.
A. albipes (Fab.), Kilmory Glen, Roanopol, Kinloch, RK.
A. marginatum (L.), Kinloch, RK.
A. muelleri (Herbst.), Kinloch, RK.
Amara lunicollis Schiodte, Kinloch, RK.
Harpalus latus (L.), Allt Mor nan Hamha, Orval, Askival, RK.
H. rufipes (Degeer), Kinloch, RK.
H. affinis (Schränk), Kinloch, RK.

HALIPLIDAE

- Haliplus fulvus* (Fab.), Loch Papadil, Monadh Mhiltich, Long Loch, GNF.
H. lineatocollis (Marsham), Loch Papadil, GNF.

DYTISCIDAE

Hydroporus discretus Fairmaire, Kilmory, Long Loch, GNF.

H. erythrocephalus (L.), Minishal, Loch an Dubh, Loch Dubh am Sgoir, GNF.

H. gyllenhalii Schiodte, Kilmory, Loch an Dubh, Monadh Mhiltich, Ard Nev, GNF.

H. incognitus Sharp, Kilmory, GNF.

**H. longicornis* Sharp, Minishal, Monadh Mhiltich, GNF.

H. longulus Mulsant, Minishal, GNF.

H. melanarius Sturm, Loch Iain, GNF.

H. nigrita (Fab.), Kilmory, Monadh Mhiltich, Ard Nev, GNF.

H. obscurus Sturm, Loch Iain, Minishal, Loch an Dubh, Loch Papadil, Monadh Mhiltich, Loch Gainmhich, GNF.

H. pubescens (Gyllenhal), Loch Iain, Minishal, Loch an Dubh, Ard Nev, GNF; Kilmory, AG & GNF.

H. tristis (Paykull), Loch Iain, Kilmory, Minishal, GNF; Monadh Mhiltich, Loch a Ghille Reamhra, Coire nan Grundd, Hallival, RK.

Oreodytes sanmarki (Sahlberg), Monadh Mhiltich, Ard Nev, GNF.

**Potamonectes assimilis* (Paykull), Minishal, GNF.

P. griseostriatus (Degeer), Minishal, GNF.

Stictotarsus duodecimpustulatus (Fab.), Loch Dubh an Sgoir, Loch Papadil, GNF.

Agabus arcticus (Paykull), Loch Iain, Minishal, Loch na Dubh, Loch Gainmhich, GNF.

A. bipustulatus (L.), Loch Iain, Kilmory, Minishal, Loch nan Eala, Loch an Dubh, Monadh Mhiltich, Ard Nev, GNF; Loch a Ghille Reamhra, Coire nan Grundd, Askival, RK; Glen Shellesder, AG.

A. congener (Thunberg), nr. Kinloch, GNF.

A. guttatus (Paykull), Ard Nev, Loch Long, GNF.

Ilybius aenescens Thomson, Loch Iain, Minishal, GNF.

I. fuliginosus (Fab.), Loch Iain, Loch nan Eala, Loch Papadil, GNF. (Hereby confirmed for the island).

Rhantus suturellus (Harris) (= *bistriatus*), Minishal, Loch nan Eala, GNF.

Acilius sulcatus (L.), Minishal, Loch Dubh am Sgoir.

Dytiscus semisulcatus Mueller, O.F., Minishal, Loch an Dubh, GNF.

GYRINIDAE

Gyrinus minutus Fab., Loch nan Eala, Loch Gainmhich, GNF.

G. substriatus Stephens, Loch Iain, Minishal, Loch nan Eala, Loch an Dubh, Loch Dubh am Sgoir, Loch Papadil, Priomh-lochs, Loch Gainmhich, GNF.

HYDROPHILIDAE

Helophorus flavipes (Fab.), Kilmory, AG & GNF. (This species hereby confirmed for the island.)

Coelostoma orbiculare (Fab.), Kilmory Glen, RK.

Cercyon melanocephalus (L.), Harris (in deer dung), RK; Kilmory, GNF.

C. littoralis (Gyllenhal), Kinloch, GNF.

Anacaena globulus (Paykull), Loch Iain, Minishal, Loch Dubh am Sgoir, Ard Nev, Loch Long, GNF; Monadh Mhiltich, RK & GNF.

Laccobius bipunctatus (Fab.), Ard Nev, Loch Long, GNF. (This species hereby confirmed for the island.)

Enochrus fuscipennis (Thomson), Loch Iain, Kilmory, Ard Nev, GNF. (This is now the correct name for the northern member of the *E. quadripunctatus* complex.)

HYDRAENIDAE

**Hydraena gracilis* Germar, Ard Nev, GNF.

Linnebius truncatellus (Thunberg), Kilmory, Ard Nev, Loch Long, GNF; Harris, RK.

LEIODIDAE

**Catops morio* (Fab.), Kilmory, AG.

SILPHIDAE

Silpha atrata L., Kinloch Castle (dead inside building), RK.

STAPHYLINIDAE

Lesteva longoelytrata (Goeze), Orval, RK.

Geodromicus longipes (Mann.), Orval, RK; Hallival, DH & RK.

G. nigrita (Mueller), Coire nan Grundd, RK.

Eusphalerum minutum (Fab.), Hallival, DH & RK.

Oxytelus laqueatus (Marsham), Harris (in deer dung), RK.

Stenus nitidiusculus Stephens, Harris, Monadh Mhiltich, RK.

**S. geniculatus* Gravenhorst, Orval, RK.

S. brunnipes Stephens, Orval, RK.

S. ossium Stephens, Roanopol, RK.

Lathrobium fulvipenne (Gravenhorst), Orval, RK.

Othius angustus Stephens, Orval, RK.

Philonthus cognatus Stephens, Kinloch, RK.

**P. splendens* (Fab.), Kinloch, RK.

P. laminatus (Creutzer), Kinloch, RK.

Platydacus stercorarius (Olivier), Kilmory, Harris Glen, AG.

Gabrius pennatus Sharp, Roanopol, RK.

Staphylinus erythropterus L., Coire Dubh, DH; Kilmory dunes, EGH; Kilmory Glen, Coire nan Grundd, Loch Papadil, Dibidil, Orval, RK.

Quedius curtipennis Bernhauer, Kilmory, AG; Kinloch, RK.

Q. nitipennis (Stephens), Orval, RK.

Q. molochinus (Gravenhorst), Coire nan Grundd, RK.

Q. tristis (Gravenhorst), Harris, RK.

Tachyporus chrysomelinus (L.), Harris Bay, AG.

Tachinus laticollis Gravenhorst, Kilmory, AG.

**Aleochara brevipennis* Gravenhorst, Kinloch, RK.

GEOTRUPIDAE

Geotrupes stercorarius (L.) Kilmory (deer and pony dung on sandy pasture), DM.

SCARABAEIDAE

Aphodius ater (Degeer), Kilmory (deer dung on moorland, deer and pony dung on sandy pasture), DM; Harris Bay (Highland cattle dung), DM.

A. borealis Gyll., Kilmory (deer dung on moorland, DM; Harris Bay (Highland cattle dung), DM.

A. depressus (Kug.), Kilmory (deer dung on moorland), DM & RK; Kilmory (deer and pony dung on sandy pasture), DM.

A. foetans (Fab.), Kilmory (deer and pony dung on sandy pasture), DM.

A. rufipes (L.), Harris Bay (Highland cattle dung), DM.

A. rufus (Moll), Kilmory (deer and pony dung on sandy pasture), DM.

Serica brunnea (L.), Kilmory (larvae in soil), DM; Harris, AG.

DRYOPIDAE

Dryops luridus (Erichson), Kilmory, Loch Long, GNF. (Recorded as *griseus* Brit auctt. in earlier lists.)

ELMIDAE

Elmis aenea (Mueller), Ard Nev, GNF.

**Limnius volckmari* (Panzer), Monadh Mhiltich, Ard Nev, GNF.

Oulimnius tuberculatus (Mueller), Minishal, Monadh Mhiltich, Loch Long, GNF.

ELATERIDAE

Hypnoidus riparius (Fab.), Hallival, Roanopol, Orval, RK.

Zorochochros minimus (Bois. & Lac.), Kinloch, AG; Hallival, RK.

Athous haemorrhoidalis (Fab.), Kilmory (larvae in deer dung on moorland), Kinloch Glen (adult on moorland vegetation), DM; Kinloch, AG & RK; Kilmory plantation, AG; Harris, RK.

Ctenicera cuprea (Fab.), Kilmory (larvae in deer dung), DM; Kinloch (adult on moorland), DM; col between Hallival and Askival, Harris, DM.

Dalopius marginatus (L.), Loch Iain, adult swept, DM.

Actenicerus sjaelandicus (Mueller), Kinloch, AG; Kilmory dunes, EGH.

Selatosomus incanus (Gyll.), Loch Papadil, RK; Kinloch Glen (adult on moorland vegetation), DM.

ANOBIIDAE

Anobium punctatum (Degeer), Kinloch Castle, RK.

CANTHARIDAE

Cantharis livida L., Loch Scresort, AG.

Rhagonycha lignosa (Mueller), Kilmory plantation, AG.

R. limbata Thomson, Bealach a Bhraigh Bhig, RK.

Malthodes flavoguttatus Kiesenwetter, Glen Dibidil, RK.

COCCINELLIDAE

**Coccinella septempunctata* L., Kinloch, larva, GER.

C. undecimpunctata L., Kilmory, JS.

CHRYSOMELIDAE

Donacia crassipes Fab., Loch Papadil, RK.

D. thalassina Germar, Loch Papadil, RK.

D. versicolore (Brahm), Minishal, GNF; Loch Papadil, RK.

Plateumaris discolor (Panzer), Kinloch, RK; Minishal, Monadh Mhiltich, Priomh-lochs, GNF.

Chrysolina staphylea (L.), Monadh Mhiltich, RK.

C. varians (Schaller), Harris, RK.

**Hydrothassa glabra* (Herbst), Kinloch, AG.

Chaetocnema hortensis Fourcroy), Harris, RK.

APIONIDAE

Apion cruentatum Walton, Hallival (One specimen was found apparently feeding on Mountain Sorrel (*Oxyria digyna*) which appears to be new foodplant), DH.

A. loti Kirby, Monadh Mhiltich, RK.

CURCULIONIDAE

Otiorhynchus arcticus (Fab.), Askival, DH; Kinloch, AG; Hallival, Roanopol, RK.

O. ligneus (Olivier), Harris, RK.

O. singularis (L.), Kilmory, AG; Harris, Papadil, RK.

O. sulcatus (Fab.), Harris Bay, AG.

Hylobius abietis (L.), Kinloch (in wood pile), RK.

**Orthochaetes insignis* (Aube), Harris, RK.

Micrelus ericae (Gyllenhal), Monadh Mhiltich, RK.

HYMENOPTERA

SYMPHYTA

TENTHREDINIDAE

Rhogogaster viridis (L.), Coire Dubh, RK.

APOCRITA

ACULEATA

FORMICIDAE

Lasius flavus (Fab.), Harris, RK.

POMPILIDAE

**Anoplius nigerrimus* (Scop.), Limestone Ridge, DW.

EUMENIDAE

**A. oviventris hibernicus* Bluethgen, near mausoleum, Harris, EMS.

Ancistrocerus scoticus (Curtis), Harris, DW.

VESPIDAE

**Dolichovespula norwegica* (Fab.), Kinloch, DW & EMS.

D. sylvestris (Scopoli), Kinloch Castle, EMS.

SPHECIDAE

**Crossocerus dimidiatus* (Fab.), Kilmory, EGH.

ANDRENIDAE

Andrena coitana (Kirby), Kilmory House, DW.

**A. tarsata* Nylander, Bagh na h-Uamha, EGH.

APIDAE

Bombus lucorum (L.), Kinloch Castle, EMS.

SIPHONAPTERA

CERATOPHYLLIDAE

Dasysyllus g. gallinulae (Dale), An Dornabae (adult on ground), DB.

SYMPHYLA

**Scutigera causeyae* (Michelbacher), Harris (on raised beach), RK.

(The identification of this species is provisional because of uncertainties in the present taxonomy of the group. However, a new class is hereby added to the island's fauna.)

ARACHNIDA

OPILIONES

Megabunus diadema (Fabr.), Kilmory Glen, RK.

PSEUDOSCORPIONES

Neobisium muscorum (Leach), Allt Mor na Hamha, RK.

ARANEAE

The list of spiders which follows was compiled by Jim Stewart from the collective results of the field work of David Beaumont, David Horsfield and himself. As only insects were covered by Wormell (1982), the 1990 results are compared with other published papers (Bristowe, 1927; Walker, 1967; Usher, 1968) and notes on file in the Nature Conservancy. These show that of the 69 species recorded here, 22 are new to the island and two have not been found before in Scotland. A discussion of the more interesting species can be found in Stewart (1991).

SEGESTRIIDAE

Segestria senoculata (L.), Kilmory, Harris.

PHOLCIDAE

**Psilochrus simoni* (Berland), Kinloch.

GNAPHOSIDAE

**Drassodes cupreus* (Blackwall), Kinloch, Harris, Papadil.

D. lapidosus (Walckenaer), Harris.

**Zelotes latreillei* (Simon), Papadil.

CLUBIONIDAE

Clubiona reclusa O. P.-Cambridge, Kinloch, Kilmory plantations, Kilmory.

C. trivialis C. L. Koch, Papadil, Dibidil track.

THOMISIDAE

Xysticus cristatus (Clerck), Kilmory, Harris, Hallival.

Oxyptila trux (Blackwall), Kilmory plantations.

PHILODROMIDAE

Tibellus oblongus (Walck.), Papadil.

SALTICIDAE

**Neon reticulatus* (Blackwall), Kilmory plantations.

Euophrys frontalis (Walck.), Harris, Papadil, Dibidil track.

**E. petrensis* C. L. Koch, Hallival.

LYCOSIDAE

Pardosa palustris (L.), Kilmory, Harris.

P. pullata (Clerck), Kilmory plantations, Kilmory, Glen Shellesder, Harris, Papadil, Hallival, Dibidil track.

P. amentata (Clerck), Kinloch, Kinloch Glen.

P. nigriceps (Thorelli), Kinloch, Kinloch Glen, Kilmory plantations, Papadil.

Alopecosa pulverulenta (Clerck), Kilmory plantations.

Trochosa terricola Thorell, Harris, Dibidil track.

Arctosa leopardus (Sundevall), Harris.

Pirata piraticus (Clerck), Kilmory plantations, Glen Shellesder, Harris, Dibidil track.

**P. uliginosus* (Thorell), Kilmory plantations.

AGELENIDAE

Tetrax denticulata (Olivier), Harris.

Cryphoeca silvicola (C. L. Koch), Kinloch, Askival.

HAHNIIDAE

**Hahnina montana* (Blackwall), Hallival.

THERIDIIDAE

Enoplognatha ovata (Clerck), Papadil.

Robertus lividus (Blackwall), Harris, Askival, Hallival.

**Pholcomma gibbum* (Westring), Kilmory plantations, Kilmory.

**Theonoe minutissima* (O. P.-C.), Kilmory plantations.

TETRAGNATHIDAE

Tetragnatha extensa (L.), Kinloch, Kilmory.

Pachygnatha degeeri Sundevall, Harris.

METIDAE

Metellina menzei Blackwall, Kilmory plantations, Dibidil track.

M. merianae (Scopoli), Kinloch Glen, Kilmory plantations, Kilmory, Harris, Papadil, Hallival.

ARANEIDAE

Araneus diadematus Clerck, Kilmory, Glen Shellesder, Harris, Hallival, Dibidil track.

LINYPHIIDAE

Ceratinella brevipes Clerck, Kilmory plantations.

**Walckenaeria clavicornis* (Emerton), Glen Shellesder.

W. cuspidata (Blackwall), Kinloch Glen, Kilmory plantations.

W. acuminata Blackwall, Kilmory plantations.

Dicymbium nigrum (Blackwall), Harris.

Dismodicus bifrons (Blackwall), Kinloch Glen, Kilmory plantations.

**Baryphyna trifrons* (O. P.-C.), Kilmory plantations.

Peponocranium ludicrum (O. P.-C.), Kilmory plantations.

Pocadicnemis pumila (Blackwall), Kilmory plantations.

**Oedothorax gibbosus* (Blackwall), Kilmory plantations.

**Tiso vagans* (Blackwall), Harris.

Monocephalus fuscipes (Blackwall), Kilmory plantations.

**Micrargus apertus* (O. P.-C.), Kilmory plantations.

**Diplocephalus cristatus* (Blackwall), Kinloch.

**Araeoncus crassiceps* (Westring), Kinloch.

**Erigone promiscua* (O. P.-C.), Kinloch, Glen Shellesder, Harris.

E. arctica White, Kinloch, Kilmory.

**E. longipalpis* (Sundevall), Kinloch.

**Hilaira frigida* (Thorell), Harris.

**Aphileta misera* (O. P.-C.) Kilmory plantations.

**Porrhomma montanum* Jackson, Askival.

Agyneta subtilis (O. P.-C.), Kilmory plantations.

**Meioneta nigripes* (Simon), Glen Shellesder, Hallival.

Centromerus prudens (O. P.-C.), Kinloch.

C. dilutus (O. P.-C.), Kilmory plantations.

Centromerita concinna (Thorell), Hallival.

Saaristoia abnormis (Blackwall), Askival, Dibidil track.

Leptyphantes alacris (Blackwall), Kinloch, Kilmory plantations.

L. tenuis (Blackwall), Kilmory.

L. zimmermanni Bertkau, Kilmory plantations, Glen Shellesder, Harris, Askival, Hallival.

L. mengei Kulczynski, Kilmory, Harris.

L. tenebricola (Wider), Kilmory plantations.

L. ericaeus (Blackwall), Kilmory plantations.

Neriere peltata (Wider), Kinloch, Kilmory plantations.

Microlinyphia pusilla (Sundevall), Kilmory plantations, Glen Shellesder, Hallival.

Comments

1. Ivermectin.

One of the participants (David McCracken) attended the meeting specifically for the purpose of investigating the insect fauna of the dung

of the herbivorous mammals on the island. While sampling the deer and pony dung at Kilmory it was noticed that although fresh dung of both types contained adult beetles and was visited by flies, the older pony dung was virtually sterile (whereas similarly aged deer dung contained dung beetle and fly larvae). A similar situation was found between deer and cattle dung at Harris.

Upon investigation it was found that both cattle and ponies are regularly treated with the antiparasitic drug ivermectin and had just been given some one and two weeks respectively prior to our visit. As ivermectin is extremely insecticidal and the majority of the chemical is excreted in the faeces of the treated animals, it is not difficult to understand why the older dung of the ponies and cattle lacked the characteristic insect fauna.

David McCracken had earlier (1987) prepared a report for the Nature Conservancy Council on "The use of ivermectin and implications for wildlife" for internal circulation so it is surprising that this chemical is being used within a National Nature Reserve. Madsen (1990) gives a topical analysis of the problems involved. The particular relevance in the context of Rum is that re-establishment of breeding populations of the Chough, which relies on food from this microhabitat, will be prejudiced.

2. Woodland.

The second element of interest is the significance of the development of woodland on Rum as the consequence of planting trees in fenced off areas. These are the trial plots in Kinloch Glen, near Kilmory, and further plantings at Harris, the south side of Loch Scresort and on the north side of Kinloch Glen.

Several species of moths, sampled both by daytime collecting and light trapping during this survey, demonstrate their utilisation of this greater habitat diversity. *Bupalus piniaria* and *Hyalaea fasciaria*, insects associated with Scots pine, are now well established in the Kilmory tree plots. Species feeding on the variety of deciduous trees and shrubs now established at Kilmory include *Ochropacha duplaris*, *Electrophaea corylata*, *Lomaspilas marginata*, *Cabera pusaria*, *C. exanthemata*, *Campaea margaritata*, *Laothoe populi*, *Phalera bucephala*, *Furcula furcula*, *Notodonta dromedarius*, *Pheosia gnoma* and *Ptilodon capucina*. The leaf miner, *Heliozela resplendella* is now well established on the

alders in the north side enclosure above Kinloch Glen. More spiders (31 out of a total of 69) were recorded from the Kilmory plantations than from any other group of sites.

These observations demonstrate how controlled tree planting can benefit biodiversity. The background and development of this programme are given in Wormell (1970, 1977).

3. Burnet Moths.

In the west of Scotland several species of Zygaenidae are of interest. On Rum the population of Transparent Burnet, *Zygaena purpuralis*, has been examined by Peter Wormell. Very little information seems to be available on the status of this moth in recent years. In the late 1950s and early 1960s there was a period when, every year, the population was very high and it occurred around Papadil, throughout the Harris valley and Glen Duain and as far inland as Loch Dornabeg; westward around the coastal cliffs to A'Brideanach occasionally as far as Bloodstone Hill in the northwest. Most of these localities have not revealed records more recently.

A search of the Harris area on 27th June 1990 only revealed a single *Z. filipendulae* (Six-spot Burnet). On 29 June no *purpuralis* were to be found in Glen Duain, where wild thyme is prolific, although the weather was suitable. It was not until Ruinsival was climbed and the 300m contour followed around to the south side of the hill that *purpuralis* was found in numbers. Here freshly emerged moths were abundant, visiting the large patches of thyme on the steep slopes which support herb-rich heath between exposures and boulders of pitted peridolite. *Z. purpuralis* were then found to occur in profusion between the 100m and 300m contours. A small series was collected for comparison with other island populations.

These herb-rich slopes seem to form an ideal breeding ground for *purpuralis* and the sun trap slopes above Papadil and Inbhir Ghil form the centre of the Rum colony of this moth. Periodically a succession of good summers would then produce an expansion and overflow of the population into Harris and up the west side of the island.

One member of the party described seeing the abundance of day-flying Lepidoptera in the Papadil area as the most spectacular display he had ever experienced. It comprised *Z. purpuralis*, *Coenonympha*

pamphilus, *Boloria selene*, *Argynnis aglaja*, and *Polyommatus icarus* in abundance along with *Z. filipendulae*, *Pieris napi*, *Maniola jurtina* and *Hipparchia semele*.

4. Water Beetles.

GNF notes that the list of Wormell (1982) should be amended to take account of the following changes. (None of the species listed here were found in the present survey.)

Halplus heydeni Wehncke. This is not a Scottish species so the record seems improbable.

Hydroporus foveolatus Heer. Wormell included this species in square brackets as early records had never been supported by independent observations. This situation still prevails.

Helophorus aquaticus (L.). The current accepted name for British examples of this species is *H. aequalis* Thoms.

Anacaena limbata (Fab.) is probably *A. lutescens* Stephens.

Acknowledgments

The participants would like to thank the Nature Conservancy Council for Scotland for assistance with organising the field work and providing accommodation while on the island. Various friends and colleagues have helped the recorders with identifications including Dr Michael Archer, Bob George, Stephen Hopkin and Peter Kirby.

Recorders

DB-David Beaumont, KB-Keith Bland, GNF-Garth Foster, AG-Adam Garside, DH-David Horsfield, EGH-Geoff Hancock, RK-Rosie & Roger Key, DM-David McCracken, GER-Graham E. Rotheray, RP-Bob Palmer, EMS-Betty Smith, MS-Melanie Spirit, RS-Bob Smith, JS-Jim Stewart, DW-Derek Whiteley, PW-Peter Wormell.

WN-Wilfred Nelson (1989). These additional records were gleaned from the photocopied and unpublished (in a bibliographic sense) 'Rhum

NNR Wildlife Report' produced in memory of the late warden. They are included specifically because they add significantly to the work of 1990.

References

Note: The island is now officially spelt Rum. However, within the reference the old spelling (Rhum) is retained where published as such.

- BRADLEY, J. D. & FLETCHER, D. S., 1979. *A Recorder's Log Book or Label List of British Butterflies and Moths*. Curwen Books, London.
- BRISTOWE, W. S., 1927. The spider fauna of the Western Isles of Scotland *Scott. Nat.*, 39: 88-94; 117-122.
- KLOET, G. S. & HINCKS, W. D., 1964. A Checklist of British Insects (Edn. 2), Pt 1: Small Orders and Hemiptera. 1977. *ibid* Pt 3: Coleoptera and Strepsiptera. 1978. *ibid* Pt 4: Hymenoptera *Handbk. Ident. Br. Insects*. XI. London.
- MADSEN, M., *et al*, 1990. Treating cattle with ivermectin: effects on the fauna and decomposition of dung pats. *J. appl. Ecol.*, 27: 1-15.
- ROBERTS, M.J., 1987. *The Spiders of Great Britain and Ireland*. Vol. 2 Harley Books, Colchester.
- STEWART, J., 1991. A few days on Rhum. *Newsl. Br. arachnol. Soc.*, 61: 5-6.
- USHER, M. B., 1968. Some spiders and harvestmen from Rhum, Scotland. *Bull. Br. Spider Study Group*, 39: 1-6.
- WALKER, P. A., 1967. Spiders collected on Rhum. *Entomologist's mon Mag.*, 103: 166-167.
- WORMELL, P., 1970. Establishing woodland on the isle of Rhum. *Scottish Forestry*, 22(3): 207-220.
- WORMELL, P., 1977. Woodland insect population changes on the Isle of Rhum in relation to forest history and woodland restoration. *Scottish Forestry*, 31(1).
- WORMELL, P., ed., 1982. The entomology of the Isle of Rhum National Nature Reserve. *Biol. J. Linn. Soc.*, 18: 291-401.

Book Reviews

The Status of Seabirds in Britain and Ireland

CLAIRE LLOYD, MARK TASKER and KENNETH PARTRIDGE, drawings by KEITH BROCKIE.

T. & A. D. Poyser Ltd., London, 1991, 355 pages, photos, tables, maps. Hardback ISBN 0-85661-061-5, £20.

The eagerly awaited results of the recent Seabird Colony Register showing the status of all the seabirds breeding in the British Isles. There are numerous maps and tables giving details of the numbers and distribution of all the seabirds, and a text which gives a resumé of changes and fluctuations since the last survey, "Operation Seafarer", in 1969. In the past 20 years, techniques and methodologies have been evolving to produce what is now the most accurate picture of British seabirds available. This book is simply the best of its kind. It will be a much used reference for many years to come. I thoroughly recommend it to anyone with even the slightest interest in seabirds.

BERNARD ZONFRILLO

Collins Guide to Animal Tracks and Signs (New Edition)

PREBEN BANG (text) and PREBEN DAHLSTROM (illust.)

Collins, London, 243 pages, photos, black/white and colour drawings. Hardback, ISBN 0-00-219881-9, £12.95.

The author and illustrator of the first edition (1974 in English translation) are now both deceased and the enlargement and revision have been carried out by Carsten Bang, the son of Preben, based on notes left behind. The new edition claims to have new and rearranged illustrations and expanded text as well as more species included.

The subjects covered are principally tracks and trails, feeding signs, droppings and pellets. The 'animals' in question are mainly mammals with a few bird references and no invertebrates. The profuse use of photographs and diagrams are a feature of the book which allow a considerable degree of confidence in identifying such evidence whilst on local safari or on return if you have forgotten to take the book with you. Even more frustrating is to forget a camera, as I have done whenever a most impressive deer wallow presents itself.

Although this book covers the whole of northern Europe and so includes such animals as beavers and beech martens, this has advantages for those going on continental holidays. The photograph of typical damage to a rotten tree trunk by a bear hunting for insects looks exactly like one demolished by an entomologist seeking rare beetles. If a bug hunter is in those parts of Europe inhabited by bears he or she need not feel quite so guilty when taking an axe to an old tree.

All in all this book is typical of the quality one has come to expect from the Collins Guides. The price is about twice as much as when I last bought one but many are now available more cheaply in paperback.

E. G. HANCOCK

Short Notes

Botanical

***Blechnum cordatum* (Desv.) Hieron and
Nymphoides peltata (S.G. Gmelin)
O. Kuntze in Argyll (V.C.98)**

B. H. THOMPSON

Soon after coming to live in Argyll in 1974 I noticed an unusual fern naturalised by the road to Craignish Castle near Ardfarn. It was not until 17th August 1991, in company with A. McG. Stirling, that a specimen was collected and sent to Clive Jermy who confirmed it as *Blechnum cordatum*.

This rather striking fern is very well established on rock exposures on the north side of the private access road at grid. ref. NM/773015. Presumably it was planted here many years ago but is obviously very much at home and has been able to spread vegetatively along a considerable length of the roadside.

Nymphoides peltata (Fringed Water-lily) was noticed in 1987 growing in a newly-made pond at Fearnoch near Taynult. Desmond Dugan, who was responsible for creating the pond, told me he had not bought the water-lily but had collected it from backwaters of the River Awe at Fanans in July 1985. It was not until 21st July, 1991, that I managed to find the plant in one small backwater on the south side of the river at NN/033293. The plants, all non-flowering, covered an area of only some 15 square metres. In 1985 the water-lily occurred in other backwaters but has since disappeared — presumably washed out in river spates.

Water-fowl seem the most likely agents for transporting the plant here, it being highly unlikely that it would have been planted in this situation.

**Smooth Rupturewort in the Glasgow Garden
Festival Site**

P. MACPHERSON

Smooth Rupturewort (*Herniaria glabra* L.) has become well established in that part of the 1988 Glasgow Garden Festival Site which lies between the South Rotunda and what was the Four Winds Restaurant. In 1990 six plants were noted in the 1km square NS/5765 and nine in the

adjacent NS/5665. Both squares are in Lanarkshire (V.C.77).

In 1991 both colonies had extended and the plant total exceeded 50.

The plants are on stony bare ground and on paths constructed at the time of the Garden Festival. It is presumed that they arrived as "stowaways" in the soil round a plant brought in for the Festival.

In the *Atlas of the British Flora* (1962) Perring and Walters give only two casual records for Scotland, both on the east coast and six extant records for England. Some years ago the plant was seen by Dr A. J. Silverside in a flower bed in Paisley (V.C.76) — comm. A. McG. Stirling.

I intend to monitor the progress of the plant as the site is developed.

***Scrophularia umbrosa* in Irvine**

R. S. LI. GRIFFITH

Whilst cutting down Giant Hogweed (*Heracleum mantegazzianum* Somier & Levier) in a nature reserve at Shewalton, near Irvine (V.C.75, NS/327371), an unusual looking specimen of figwort was noted growing in a wet and well shaded area amongst the 'Giant Hogweed forest' which borders the River Garnock.

Upon closer inspection the plant was identified as *S. umbrosa* Dum. (formerly *S. ehrhartii* Stevens; *S. alata* Gilib.). Known as the Green Figwort it has been referred to by other authorities as the Western, Shady or Scarce Water Figwort.

This is a very rare species in Ayrshire, however it has been recorded from a number of sites in the Clyde area, such as one at Woodhall. In the past a site has been known to exist as far north as Arrochar.

The species is often confused with *S. aquatica* L., however the lack of red colouration, the broadly winged stem and the 2-lobed scale on the upper petal lip help to clearly distinguish it.

I would like to thank Mr A. McG. Stirling for the final confirmation of the plant's identity.

***Limosella aquatica* L. in the Kilmarnock Area**

R. S. LI. GRIFFITH

In early September whilst undertaking a botanical survey of North Craig Reservoir (V.C.75) a group of several hundred small semi-aquatic plants were found growing on a short stretch of otherwise bare mud at the water's edge.

The species was identified as being the Mudwort (*L. aquatica*), having spatula-like leaves, tiny white flowers and a rosette growth habit with creeping runners.

Many specimens had been growing partly submerged and on a return visit in early October the plants were very difficult to relocate, having been badly damaged by the waves whipped up by autumn gales.

This very rare annual plant is recorded in Lee's *Flora of the Clyde Area* (1933) from Largs and Hardgate. *Watsonia* Vol. 15, 118 (1984) suggests that *L. aquatica* is spreading in Fife, V.C.85, whilst the *Atlas of the British Flora* (1962) records it for only four sites in Scotland.

The Glasgow Naturalist Vol. 21, 220 (1986) records that the Flora of Glasgow project has found the Mudwort at Balgray Reservoir, Barrhead, V.C.76 and on the River Clyde, near Cambuslang.

I am grateful to Ms. Lesley Brown of NCCS and to Mr A. McG. Stirling for the final confirmation of the plant's identity.

Winter Heliotrope in Ayrshire V.C.75

R. S. LI. GRIFFITH

In the southern parts of Britain, *Petasites fragrans* (Vill.) C. Presl, the Winter Heliotrope, is fairly common, particularly south of the Thames. The species is highly invasive and was originally introduced from France in 1806 as a parlour and garden plant.

In Scotland it has a wide distribution, but has so far remained only locally common. Whilst doing fieldwork with school pupils from Ardrossan Academy we have come across *P. fragrans* at two new sites, one beside the River Garnock near Irvine and another at Seafeld Residential Education Centre in Ardrossan. In Ayrshire *P. fragrans* has only otherwise been recorded at a site near the Heads of Ayr and another on the roadside verge near Wemyss Bay pier.

Only the lilac-coloured and vanilla-scented flowers of the male plants are found in Britain. As suggested by its common name, the heart-shaped leaves persist through the winter, whilst the flowers appear in early spring.

The plant is generally only able to spread to new sites by vegetative means; through the transport of pieces of its extensive creeping rhizome, partly explaining its limited distribution in comparison with related species such as *P. hybridus* (L.) P. Gaertner, B. Meyer & Scherb., the Butterburr, which is able to set seed.

***Carex buchananii* in Glasgow**P. MACPHERSON and
A. C. MACPHERSON

In 1990 a tufted sedge with seven flowering stems was seen on relatively bare waste ground in the Cessnock district of Glasgow (V.C.77). The area had been used in 1987 and early 1988 to store container grown shrubs while the Garden Festival site was being prepared.

In 1991 there were two flowering plants, one with twelve flowering stems and the other with nine. In addition, at a distance of eight yards, two non-flowering plants were present.

The mature plant is distinctive, being of a reddish colour, about 20" tall and with the leaf ends very thin and curled on themselves.

Identification was by A. C. Jermy and D. A. Simpson, Mr. Jermy reporting that the plant is mentioned in the *European Garden Flora*. We see that it is listed by Philip and Lord in *The Plant Finder* 1990/91 as available from a number of specialised nurseries.

It was also identified independently by Mr. E. J. Clement, who informed us that it is a New Zealand endemic and that he believed ours to be the first record from the wild in Britain.

Presumably the sedge was introduced as a "stowaway" along with the containerised plant material.

***Pulicaria dysenterica* (L.) Bernh.
in Dunbartonshire**

A. McG. STIRLING

In August 1991 Mr. Keith Futter reported having found the Fleabane (*Pulicaria dysenterica*) near Helensburgh, Dunbartonshire. This discovery was of considerable interest as the species is distinctly rare in the west of Scotland, being found only in Galloway, Arran, Kintyre and Islay, usually near the sea shore in damp habitats.

Later in the same month the writer, accompanied by the BSBI Recorder Alison Rutherford, visited the site indicated by Mr. Futter and located a small patch of the Fleabane consisting of about a dozen stems, several of which were flowering. The plants were growing at the side of a drainage ditch alongside a recently constructed forestry road at Bannachra Muir (NS 33-83-). Although the situation appeared rather disturbed due to the forestry operations there is no reason to suppose that the Fleabane is not native there. The record is new for V.C.99.

Zoological

Adistemia watsoni (Wollaston) Coleoptera: Lathridiidae in Scotland

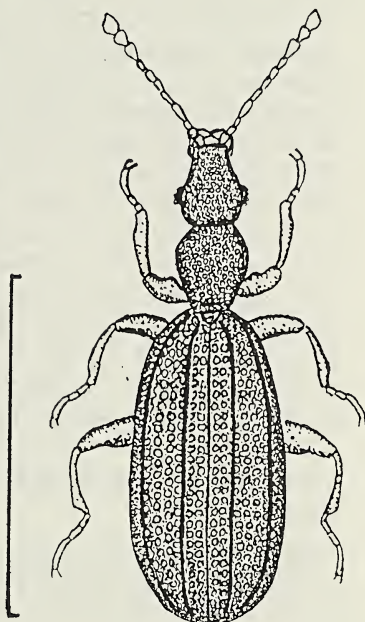
E. GEOFFREY
HANCOCK

Fig. 1 *Adistemia watsoni*
(Woll.) Scale line 1mm

Several examples of the lathridiid beetle, *Adistemia watsoni* (Woll.) (Fig. 1) were found on 29th October 1991 inside a museum display case containing preserved animals at Kelvingrove Museum, Glasgow. This family includes species which are familiarly known as plaster beetles and are associated with feeding on minute fungal growths in buildings or out of doors. The family contains a number of species which have been introduced to the British Isles from other countries and climes, of which this is one. The exact origin of *A. watsoni* is uncertain but another member of the same family, *Aridius bifasciatus* (Reitter), has reached here from Australia and has been found in Scotland for several decades now.

A. watsoni appears to have been associated with museums on several of the few occasions it has been seen in Britain. Earlier records include the Hancock Museum, Newcastle-upon-Tyne and the Natural History Museum, London. It has been found out of doors and in domestic situations, but its small size (our specimens are all exactly 1.44mm long) might prevent its being observed more frequently. It is also markedly flattened which probably enables it to gain entrance into apparently enclosed spaces. One of the most recent notices of its distribution is given by Colin Welch (1983, *Entomologist's Monthly Magazine*, 120: 206) although he was unaware at the time of the specimens in the collection of the Royal Museum of Scotland which had been found in a house in Edinburgh in November, 1982. The two known occurrences in Scotland to date presumably give an artificial picture of the actual situation.

I would like to thank Mr. Martin Brendell of the Natural History Museum and Dr. Graham Rotheray of the Royal Museum of Scotland for information.



Purple Hairstreak in Glasgow

RICHARD SUTCLIFFE

On 1st August 1990, Christopher Stevenson, a member of the British Butterfly Conservation Society was observing butterflies around the edge of Garscadden Wood (V.C.77). He was very surprised when a Purple Hairstreak butterfly *Quercusia quercus* (Linnaeus) alighted on low vegetation at the western end of the wood. A small number of others could be seen in flight at the top of an oak tree nearby. This species is dependent on the presence of oak trees, as the larvae feed exclusively on the buds and young foliage of oak. It is therefore restricted to areas where there are oak trees present. The nearest known site for the Purple Hairstreak, prior to this discovery was near Drymen, and the butterfly is relatively common on the eastern shore of Loch Lomond. This is the first time this species has been positively identified within the City of Glasgow, although a visitor to Kelvingrove Museum in the mid-1980s thought he might have seen one in the woods at Castlemilk. The butterfly has probably been present but simply overlooked at Garscadden and may occur in suitable woods elsewhere in the Glasgow area.

A joint GNHS/BBCS excursion to Garscadden Wood on 4th August 1991 established that the butterfly is present in good numbers there, although none of the members present were able to get a good look at them, since they tend to fly around the tops of the trees and must be observed using binoculars!

A Juvenile Loggerhead Turtle from Colonsay

RICHARD SUTCLIFFE

In *Glasg. Nat.* 22:82, Swinney and Yoxon (1991) describe the finding of a juvenile Loggerhead Turtle, *Caretta caretta* (Linnaeus, 1758) on the Isle of Canna on 28th February 1990. Exactly a year later, on 28th February 1991, another juvenile of the same species was found dead stranded at Port nam Fliuchan on the west coast of Colonsay by Mr. John Gray.

The skin was starting to come away from around the head, but otherwise the turtle was in reasonably good condition.

The specimen is almost twice the length of the one from the Isle of Canna. Its measurements are:

Total length (in a straight line):	401mm
Length of carapace (in a straight line):	280mm
Breadth of carapace (in a straight line):	238mm

The specimen has been donated to Glasgow Museum's collections (Registration number NHZ1991-28), by Mr. Gray and has been preserved in spirit.

**First breeding records of Shelduck and Black B. ZONFRILLO
Guillemot on Ailsa Craig, Ayrshire (V.C.74) and M. NOGALES**

Following an extensive campaign to eradicate Brown Rats (*Rattus norvegicus* Berkenhout) from Ailsa Craig in early 1991, two species of hole-nesting birds were recorded breeding for the first time in summer 1991.

Shelduck, *Tadorna tadorna* L.

For the past eight years at least, Shelduck have been recorded regularly in spring on Ailsa Craig. Initially only one or two birds were seen but a maximum of 11 altogether was noted in April 1990. Birds had been seen inspecting suitable burrows and holes but no nest or evidence of breeding was ever recorded. On 20th April 1991 one of three pairs present was observed courtship-fighting over the ruined castle on Ailsa Craig. On 21st May 1991 a female was discovered incubating a clutch of 8 eggs under a large boulder on a scree above the castle. The nest was checked regularly and 7 of the 8 eggs hatched on 13th June. The nest had been checked the previous day and the female was incubating. No young were seen, nor parents thereafter and it is assumed that the chicks were led down to the sea and away from the island under cover of dark, a tactic frequently employed by Eider Ducks *Somateria mollissima* (L.). There is no suitable "estuary" type feeding habitat on Ailsa Craig and the 15 kilometre swim to the mainland must be hazardous for the small chicks.

Another pair of Shelduck at the west side of the island also probably nested. The female was seen flying over, and then landing amongst, a well-vegetated boulder scree on 11th June, but the nest could not be located.

There are no previous records of Shelduck breeding on Ailsa Craig.

Black Guillemot *Cephus grylle* (L.)

This species has been seen on the waters around Ailsa Craig for many years (Gibson, 1951, *Scott. Nat.* 63: 159), but no breeding or attempted breeding records have been noted. A peak count of 8 together off the west side of Ailsa Craig on 1st July 1989 was a big increase on the usual two or three. Black Guillemots appear around the island in March and are frequently seen into late summer. On 18th May 1991 we disturbed a Black Guillemot from a crack in a huge granite boulder on the west side of Ailsa Craig. The bird had come off one egg which could be clearly seen down the crack; it was completely inaccessible. The usual clutch for this species is two eggs but no second egg appeared.

On 21st June a single downy young was observed and was regularly checked until 21st July when it had probably fledged. An adult with one young was seen at sea just off Ailsa the following day, but there were no further sightings after that date. Black Guillemots are known to be susceptible to rat predation (Ewins & Tasker, 1985, *Bird Study* 32:186) and this breeding success indicated a probably absence of rats from this area of the island.

Black Guillemots breed regularly at one or two places on the Ayrshire coast and on man-made structures such as at Ardrossan Harbour. Further up the Clyde estuary at Port Glasgow they utilised the eaves of an abandoned waterfront factory and successfully reared young (Carnduff, 1981, *Scot. Birds* 11:195). It is hoped conditions on Ailsa Craig will remain suitable for this species to be added to the seabirds regularly breeding on that island.

Airborne Introductions? First Records of the Rabbit on Rum and the Mole on Islay A. C. KITCHENER, D. A. STROUD, J. M. STROUD, N. EASTERBEE and W. NELSON

On 21st June 1988 the skull of a lagomorph was found (by W.N.) on a sea stack off the south-east coast of the island of Rum (GR/407932). The skull lacks nasal bones and much of the occipital region. All teeth are missing except for the two upper incisors on the left hand side. The maximum length of what remains of the skull is 73.15mm and the zygomatic arch width is 39.5mm. Despite its rather fragmentary state, the skull is clearly that of a Rabbit, *Oryctolagus cuniculus* (L.). It is now registered in the collections of the National Museums of Scotland (NMSZ 1989.062).

Lagomorphs do not occur naturally on Rum, so that the presence of this skull on the sea stack indicates some other agency was involved in its arrival there. The sea stack was inhabited at the time by about 20 breeding pairs of Great Black-backed Gulls, *Larus marinus* L. The gulls may have preyed on or scavenged the Rabbit elsewhere before bringing it back to the nest site (Cramp and Simmons, 1983, *Birds of the Western Palaearctic*, 3:853. Oxford Un. Press).

This phenomenon of airborne introduction of mammals by birds is possibly not unique. We would also like to report a dead Mole, *Talpa europaea* L., found (by J.M.S.) in November 1983 at Kindrochid in the north-west of Islay (NR/233687), where Moles are unrecorded (e.g. Corbet and Harris, 1990, *The Handbook of British Mammals* ed. 3 Blackwell). The specimen had been dead for some time (weeks or months

rather than days) and was found amongst clumps of *Juncus* spp. in a poorly drained field about 800 metres from the nearest road and 100 metres east of the cottage at Kindrochid. The apparently uninjured Mole was dorso-ventrally flattened with its head tucked underneath the body. The head and body length of the air-dried specimen is estimated to be about 130mm, which is slightly shorter than average for both male and female adult Moles (Stone and Gorman in Corbet and Harris, *loc. cit.*) It is now registered in the collections of the National Museums of Scotland (NMSZ 1985.036).

This Mole could have been a young adult that was picked up by a bird as it dispersed on the surface of the ground during the late summer (Gorman and Stone, 1990, *The Natural History of Moles*, Helm), and could have been carried to Islay and subsequently dropped. In this case it is not clear what bird, if any, might have been involved. However, the nearest possible source of this specimen is the mainland of Kintyre, which is, at closest, 20.5 kilometres from Islay. However, Kindrochid is more than 50 kilometres from the mainland. Avian transportation to Kindrochid assumes that the carcass was carried not only over the sea, but also the breadth of Islay. Other possibilities for its transport there include its being taken there by people either on or in a vehicle. A request for further sightings, or other information concerning Moles on Islay, was placed in the local newspaper (*Ileach* 10th March 1984), but no response was elicited. There have been no more recent records of the Mole from Islay (M.A. Ogilvie pers. comm.).

Book Reviews

Pocket Guide to Birds of Prey of the World

MARTIN WALTERS

Mitchell Beazley, 1991, 192 pages, black/white and colour drawings. Hardback, ISBN 0-85533-864-4, £6.99.

Covering all the world's birds of prey, this is the latest in a series of attractively produced, yet modestly priced, wildlife guides from the publishing house of Mitchell Beazley. All 295 species are illustrated in colour, accompanied by concise notes on each bird's description, ecology and conservation. And yes, this slim volume will actually fit into the pocket as the title suggests. Having said that, as the book is more of a mini reference work than a source of quick identification of any raptor which briefly appears in binocular view, ornithological globe-trotters will almost certainly be better served by a comprehensive avian field-guide for the specific region they are planning to visit.

JOHN MITCHELL

Recent surveys and research on butterflies in Britain and Ireland: a species index and bibliography

PAUL T. HARDING and STUART V. GREEN

Biological Records Centre, NERC Institute of Terrestrial Ecology, Monks Wood Experimental Station, Huntingdon PE17 2LS, 1991, 42pp, Paperback, ISBN 1 870393 155, £2.50 including p. & p.

This is a very useful new publication for anyone with a serious interest in British butterflies. The authors have compiled a list of 240 of the latest references (mainly from the 1970s and 1980s), covering subjects such as biology, ecology, conservation, distribution and habitat requirements. A list of references and on-going surveys and research is given for each resident British species, except for the Large and Small Whites which have been deliberately omitted.

Many of the references will undoubtedly be difficult to obtain, as they include many unpublished reports; but knowing such a report exists at all is half the battle! The authors acknowledge the list will be incomplete and will soon become out of date, but it will still be well worth consulting in the first instance.

The bibliography clearly shows that whilst some species such as the Chequered Skipper, Heath Fritillary, Large Blue and other well known butterflies have been studied in detail, others such as the Small, Dingy and Grizzled Skippers appear to have been almost ignored. With few notable exceptions, little research seems to have been done in Scotland. Even with predominantly Scottish species such as the Scotch Argus and Northern Brown Argus, the research has nearly all been done in their English localities! Perhaps the publication of this bibliography will spur some people on to study some of our 'neglected' species.

RICHARD SUTCLIFFE

Editorial – the Numbering of the Sessions of the Glasgow Natural History Society

Sessions of the Glasgow Natural History Society date back to the amalgamation, in 1931, of three earlier societies, the Natural History Society of Glasgow (founded 1851), the Andersonian Naturalists' Society (1885) and the Microscopical Society of Glasgow (1886). At the outset the new Society was named the Glasgow and Andersonian Natural History and Microscopical Society but in 1956 this was abbreviated to The Andersonian Naturalists of Glasgow. Finally, in 1979, the present name was adopted "in order to make the aims of the Society more explicit and to show the links with similar organisations throughout the British Isles".

While preparing the "Officers and Council" page for the present issue of *The Glasgow Naturalist* difficulty was experienced in trying to relate the roman numerals needed to designate the 60th Session, 1990, clearly **LX**, to those used previously. It was then discovered that the numbering went wrong in 1981 when the 50th Session was designated **XLX** instead of **L**. This apparently unnoticed excess of **Xs** was perpetuated in subsequent years so that the 59th Session 1989, was designated **XLXIX** instead of **LIX**. The matter has now been rectified and apologies are offered.

Advertisement

Lee, J. R. 1933, *The Flora of the Clyde Area*.

Professionally bound copies of the original printing of this Flora can now be provided to order, price £7.50 to members of the *Glasgow Natural History Society* and to the book trade, £10.00 to others (p. & p. 50p extra). This is still the only work of its type on the area and is in diminishing supply.

Obtainable from *The Librarian* at the address given on the inside of the back cover.

Proceedings 1990

The chairman, place* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

*GMK: Glasgow Art Gallery and Museum, Kelvingrove

UGBD: University of Glasgow, Botany Department

- 9 JANUARY.** Mr E. G. Hancock, UGBD, 31.
Mrs W. Ewing: Natural History section of 21st Paisley International Colour Slide Exhibition.
- 23 JANUARY.** Mr R. Sutcliffe, UGBD, 32.
Mr Ian Rolfe: Early Life on Land.
- 13 FEBRUARY.** Dr J. H. Dickson, UGBD, 36. 60th A.G.M.
Activities during 1989 were reported, elections held and appointments by Council announced (see page 204).
Council reported that at the end of 1989 there were 259 members (227 Ordinary, 9 Honorary, 19 Family, 3 Junior and 1 School member). Three Council and 3 Executive meetings had been held. There had been 11 indoor meetings, including the A.G.M., the Exhibition meeting with social evening, and 2 other social evening events. Twenty excursions were arranged for the summer. Five Newsletters of increasing interest and improving presentation had been published.
The A.G.M. was followed by an audiovisual presentation by T. N. Tait on the history and related natural history of the Glen Moss site in Renfrewshire.
- 13 MARCH.** Mr E. G. Hancock, UGBD, 41.
Dr D. C. Houston. Vultures.
Exhibits: Ancient pine stump from Drumpellier (J. H. Dickson); Glasgow Woodlice Survey (E. G. Hancock); Library additions (R. H. Dobson)
- 10 APRIL.** Mr E. G. Hancock, UGBD, 22.
Mr T. N. Tait and members. Members' slide show: Hoverflies, Caledonian pine forests, woodlice (E. G. Hancock); Orchids (W. Parks); Clubmoss at Ruchill (N. R. Grist); Synchronised sound and slide show of Glen Moss and surrounding SSSIs (T. N. Tait).
- 8 MAY.** Mr E. G. Hancock, GMK, 55.
Mrs Camilla Dickson: Goodfellow Lecture "Memoirs of a Midden-mavis (microscopic pollen study elucidating diet of Roman soldiers at the Antonine Wall).
- 12 JUNE.** Social evening at Pollock House, attended by 35 members and friends.

- 28 SEPTEMBER.** GMK, 42 members and friends.
Annual Exhibition Meeting, with cheese and wine.
 Exhibits: Morel and Ailsa Craig flora (B. Zonfrillo); Chestnut "conkers" (B. Hancock); New Zealand Flatworms (E. G. Hancock); Glasgow garden wild plants (A. C. Macpherson); Herbarium specimens (P. Macpherson); Display boards, aquarium, seaweed (W. Scotland Marine Conservation Society); Bird pictures (M. Lyth); Lapidary specimens (W. Scotland Mineral & Lapidary Society); Dragonfly *Aeshna cyanea* (R. Sutcliffe); Flora of Glasgow herbarium specimens (J. H. Dickson); New Zealand sea shells (M. Cohen); insects (Strathclyde University Dept. of Bioscience & Biotechnology); terrestrial gastropods (N.R. Grist); Viviparous plants (J. Millar); Cornish Fish Sucker from Clyde (J. Hearnshaw).
- 9 OCTOBER.** Mr E. G. Hancock, GMK, 35.
 E. G. Hancock & C. Rawcliffe (Edinburgh N.H.S.): An evening with woodlice.
 Exhibits: live woodlice.
- 3 NOVEMBER.** Mr E. G. Hancock, UGBD, .
 G. N. H. S. Joint meeting the B.S.B.I. and B.S.E.
 John Mitchell. On Northern Hills.
 Exhibits: Dunbarton flora (A. McG. Stirling); *Chara rudis* in Scotland (N. Stewart); Caithness & Sutherland plants (J. K. Butler); B.S.B.I. meeting, Tiree (A. Walker and A. McG. Stirling); *Crepis praemorsa* (G. Halliday); Melrose flower paintings (B. Young); *Euphrasia "Fharidensis"* (A. Silverside); Midlothian records (D. R. McKean); Botanist in Berwickshire (M.C. Braithwaite & D. G. Long); Plants from S. Scotland (R. Connor); Kindrogan *Hieracia* (J. Bevan); Glasgow area discoveries 1984-90 (J. H. Dickson & K. J. Watson); Wild plants in Glasgow garden (A. C. Macpherson); Recent Lanarkshire records (P. Macpherson); British, non-native (A. Rutherford); *Arrhenatherum elatius* subsp. *bulbosum* (A. Rutherford); *Calamagrostis purpurea* from Argyll (O. M. Stewart); Kirkcudbright records (O. M. Stewart)
- 13 NOVEMBER.** Mr E. G. Hancock GMK, 43.
 Mr T. N. Tait and members. Members' slide show: Lupin aphids, entomology and wildlife of Rum (E. G. Hancock); New Zealand wildlife and scenery (E. Minnis); Arran field trip (R. Sutcliffe); Conservation tree planting (J. Millar); Plants, wildlife and archaeology, Turkey (R. Burns); Early Marsh Orchid and hybrids near Milngavie (F. Robertson); Grazing and slime trails of slugs (N. R. Grist); Flora of Pyrenees (A. McG. Stirling); Birds in Africa (J. Morgan); Mull, Carsaig coast, geology, flora and fauna (I. C. Christie); Mojave Desert (I. C. Christie).
 Exhibits: Sheep skull (M. Lyth); Gecko from Venezuela (J. H. Dickson).
- 11 DECEMBER.** Annual Dinner, Dining Rooms of Glasgow University Staff Club, attended by 44 members and friends, followed by slides of undersea life in Red Sea (Mary Childs).

Officers and Council SESSION LX 1990

- President:* E. Geoffrey Hancock, B.Sc., F.M.A.
Vice-Presidents: T. Norman Tait, A.B.I.P.P., F.R.P.S.
 Mrs Jean Millar
 Mrs Elspeth L. S. Lindsay, M.B., Ch.B.,
 F.R.C.R.
- Councillors:* Miss Lorna J. Smith, G.I.Biol.
 Derek Blackburn, B.Sc.
 Mrs Lyn Dunachie, B.Ed.
 Keith R. L. Cohen, B.Sc., G.I.Biol.
 Iain C. McCallum
 Mrs Edna Stewart, B.Sc.
 Iain C. Wilkie B.Sc., Ph.D.
 Mrs June P. McKay
 Mrs Agnes Walker, B.Sc., M.Sc., Ph.D.
- General Secretary:* Norman R. Grist, B.Sc., M.B., Ch.B., F.R.C.P.,
 F.R.C.Path.
- Treasurer:* Robert Gray, B.Sc., M.I.Biol.
Librarian: Mrs Ruth H. Dobson, B.Sc. M.Sc.
Editor: Ronald M. Dobson, M.A., Ph.D.
- Conveners of Sections:* James H. Dickson, B.Sc., M.A., Ph.D., F.L.S.
 (Botany)
 Richard Sutcliffe (Geology)
 T. Norman Tait, (Photography)
 E. Geoffrey Hancock (Zoology)
- Auditors:* E. L. Sharp, M.A.
 E. T. Watt, B.Sc.
- Trustees:* James H. Dickson
 Peter Macpherson, F.R.C.P., F.R.C.R., D.T.D.C.,
 F.L.S.
- Assistant Secretaries:* Keith R. L. Cohen (*Fund-raising and Publicity*)
 Miss Lorna J. Smith (*Minutes*)
 Richard Sutcliffe, B.Sc., A.M.A. (*Membership*)
 Mrs A. Craib, M.A. (*Social*)
- Editorial Board:* The Editor
 Allan McG. Stirling
 James H. Dickson
 Iain C. Wilkie, B.Sc., Ph.D.
- Representatives:* Robin Knill-Jones, M.A., M.B., B.Chir., M.Sc.,
 D.P.H., F.R.C.P., M.F.C.M. (*Scottish Wildlife
 Trust*)
 Mrs Agnes Walker (*Glasgow Urban Wildlife Group*)

The Glasgow Naturalist

This publication is included in the abstracted and indexing coverage of the Biosciences Information Service of *Biological Abstracts* and in that of *CABS* (Current Awareness in Biological Sciences).

The following back numbers are available for purchase at the prices shown (plus postage).

Volume II	(1909-10)	Parts 1, 2, 3, 4	} £1.50 each
Volume III	(1910-11)	Parts 1, 2, 3, 4	
Volume IV	(1911-12)	Parts 1, 2, 3, 4	
Volume V	(1912-13)	Parts 1, 2, 3, 4	
Volume VI	(1913-14)	Parts 1, 2, (3 + 4)	} £1.25 each
Volume VII	(1915)	Parts 1, 2, 3, 4	
Volume VIII	(1916-18)	Parts 1, 2, 3, 4, 5, 6	
Volume XIII	(1937-38)	Parts 1, 2	
Volume XIV	(1940-44)	Parts 1, 2, 3	} £1.00 each
Volume XV	(1945-49)	Parts 1*, 2, 3	
Volume XVI	(1951-52)	Parts 1, 2, (3 + 4)	
Volume XVII	(1952-56)	Parts 1, 2, 3, 4, 5, 6	
Volume XVIII	(1958-71)	Parts 1, 2, 3, 4, 5, 6, 7	} £1.25 each
		Parts 8, 9	
		Part 10	
Volume XIX	(1973-79)	Parts 1, 2, 3, 4	£2.00 each
		Part 5	£2.50
		Part 6	£4.00
Volume XX	(1980-84)	Parts 1, 2, 3, 4, 5	£4.00 each
Volume XXI	(1985-86)	Part 1, 2	£4.00
	(1987-90)	Parts 3, 4, 5	£5.00 each
Volume XXII	(1991)	Part 1	£5.00

*Part 1 contains (18pp) *The Flora of Easter Dunbartonshire* by J. R. Lee.

¶Part 2 contains (18pp) *Additions to the flora of the Clyde Area* by J. R. Lee.

§Part 6 (82pp) is a list of the less common Scottish Basidiomycetes by D. A. Reid and P. K. C. Austwick.

Of the earlier journals, the only parts available are:

The Annals of the Andersonian Naturalists' Society:

Volume IV Part 3 £1.00

Proceedings and Transactions of the Natural History Society of Glasgow:

Volume I	(1885-86)	Part 3	} £1.50 each
Volume II	(1886-88)	Parts 1, 2	
Volume VI	(1899-1901)	Parts 1, 2	
Volume VII	(1904-05)	Part 3	
Volume VIII	(1905-08)	Parts 1, 2	

Orders for any of the above and for copies of the current and future issues, or for reprints or photocopies should be addressed to *The Librarian*:—

Mrs R. H. DOBSON,
7 NETHERBURN AVENUE,
GLASGOW, G44 3UF.

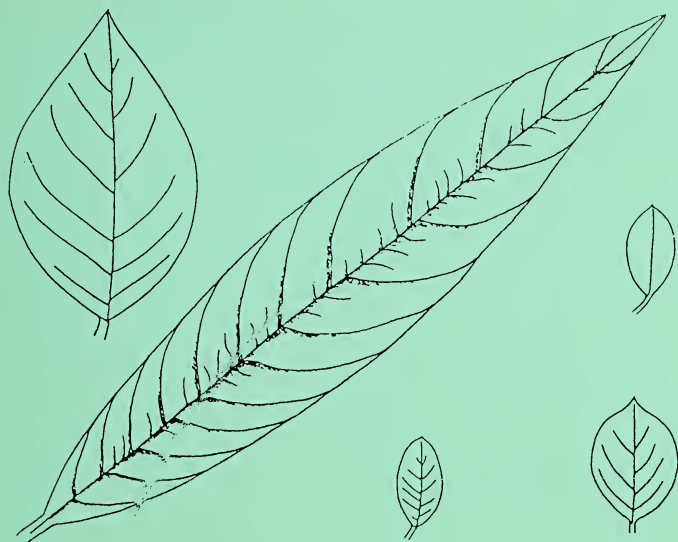
Contents

Page

- 103 Further notes on the Reverend John Stuart's Contribution to the Discovery of Britain's Mountain Flowers, JOHN MITCHELL.
- 106 Book Reviews: Flowers of the Mediterranean (3rd ed.) OLEG PALUNIN and ANTHONY HUXLEY; Crucifers of Great Britain and Ireland, T.C.S. RICH.
- 107 A Note on the Crayfish of Loch Croispol, W. J. THOMAS.
- 110 Book Reviews: Bird Watching for the Under Tens, BILL ODDIE; Birds and Forestry, MARK AVERY and RODERICK LESLIE.
- 111 Cotoneasters in the Glasgow Section of V.C. 77, P. MACPHERSON and E. L. S. LINDSAY.
- 115 A Late-Devensian Marine Fauna from the 'Clyde Beds', Linwood and Johnstone, Renfrewshire, J. GORDON TODD.
- 124 Book Review: An Artist on Migration, BRUCE PEARSON.
- 125 Some naturally occurring Flowering Plant Hybrids in the Glasgow Area, K. J. WATSON and J. H. DICKSON.
- 132 Book Notice: Wild Plants of Glasgow, J. H. DICKSON.
- 133 Alexander Patience and his Work on Woodlice (Crustacea: Isopoda) in the Clyde Area with a List of Recorded Species, E. G. HANCOCK.
- 139 Book Review: Flora of the Outer Hebrides, R. J. PANKHURST and J. M. MULLIN.
- 140 Book Review: Bird Migration, THOMAS ALERSTAN; Audiotape Review: Beginning Birdsong, KEN JACKSON.
- 141 The Natural History of the Muck Islands, North Ebeudes 8. Bryophytes of Muck, N. G. HODGETTS.
- 155 Obituary: Blodwen Lloyd-Binns, MSc, PhD, DSc, FLS.
- 159 Insect Records from the West of Scotland in 1990, E.G. HANCOCK.
- 162 Obituary: Iain Colin Christie, BSc (1930-1991).
- 165 Introduction of another non-native Fish Species to Loch Lomond: Crucian Carp (*Carassius carassius* (L.)).
- 169 Some Records of Terrestrial Invertebrates from Rum National Nature Reserve 1990, E. G. HANCOCK.
- 190 Book Reviews: The Status of Seabirds in Britain and Ireland, CLAIRE LLOYD, MARK TASKER and KENNETH PARTRIDGE; Collins Guide to Animal Tracks and Signs (New ed.), PREBEN BANG and PREBEN DAHLSTROM.
- 191 Short notes
- 200 Book Reviews: Pocket Guide to Birds of Prey of the World, MARTIN WALTERS; Recent Surveys and Research on Butterflies in Britain and Ireland: a Species Index and Bibliography, PAUL T. HARDING and STUART V. GREEN.
- 201 Editorial – The Numbering of the Sessions of the Glasgow Natural History Society; Advertisement: The Flora of the Clyde Area, J. R. LEE.
- 202 Proceedings 1990.
- 204 Officers and Council, SESSION LX 1990.

Q14
G5X
NH

The Glasgow Naturalist



Cotoneaster update, page 239

Volume 22

**Part 3
1993**



The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow or the Glasgow Art Gallery and Museum.

The present rates of subscription per annum are: for Ordinary Members, £10. (£9 if paid before the A.G.M.); Family Members, £2 extra; Junior Members (under 21), £5; School Members, £1. Payment by Direct Debit is encouraged. Further information regarding the Society's activities and membership application forms are obtainable from the *General Secretary*:

C/O NATURAL HISTORY DEPARTMENT,
MUSEUM & ART GALLERY,
KELVINGROVE,
GLASGOW, G3 8AG.

The Glasgow Naturalist

Published by the Glasgow Natural History Society
ISSN 0373-241X

February 1993
Price £6.00

Edited by R. M. Dobson with the assistance of J. H. Dickson, R. H. Dobson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Kent, D.H. 1992. *List of Vascular Plants of the British Isles*. B.S.B.I., London.

All communications on editorial matters should be sent to:

Dr R. M. DOBSON,
ZOOLOGY DEPARTMENT,
UNIVERSITY OF GLASGOW,
GLASGOW G12 8QQ.

A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

Some Observations on the Effects of Mineral Solids Deposition on Littoral Invertebrates in Loch Lomond

C. R. DOUGHTY

Clyde River Purification Board, East Kilbride, Glasgow
G75 0LA.

Introduction

During 1986-87, work on the re-alignment and upgrading of the A82 road running along the west shore of Loch Lomond resulted in contamination of the loch with mineral solids. Although the Clyde River Purification Board took action to prevent dumping of excavated spoil in the loch, accidental contamination arose from solids being washed into the loch from excavated areas during periods of heavy rain and from material used to infill parts of the loch to support the new road. In some places, the deposits formed an unsightly silted zone up to 20m wide along the shore. The worst affected area was at Firkin, the main access point to the construction site.

In this paper the littoral invertebrate community at Firkin is compared with that at a less contaminated site nearby.

Methods

The area surveyed lies on the west shore of Loch Lomond between Inverbeg and Tarbet (Fig. 1). A site was selected at NN 337009 on the north side of Firkin Point where silting was heaviest. The stony shore was covered with a layer of sandy material forming a clearly demarcated band in shallow water parallel to the shoreline. For comparison, a site was chosen at NN 336012 in an embayment on a small promontory near Stuc an t-Iobairt. The shore here was composed of stones and gravel with some large boulders. When first sampled, there was no evidence of contamination and the stones were covered with a thin film of filamentous algae. The two sites, situated about 400m apart, had similar degrees of exposure to wave action.

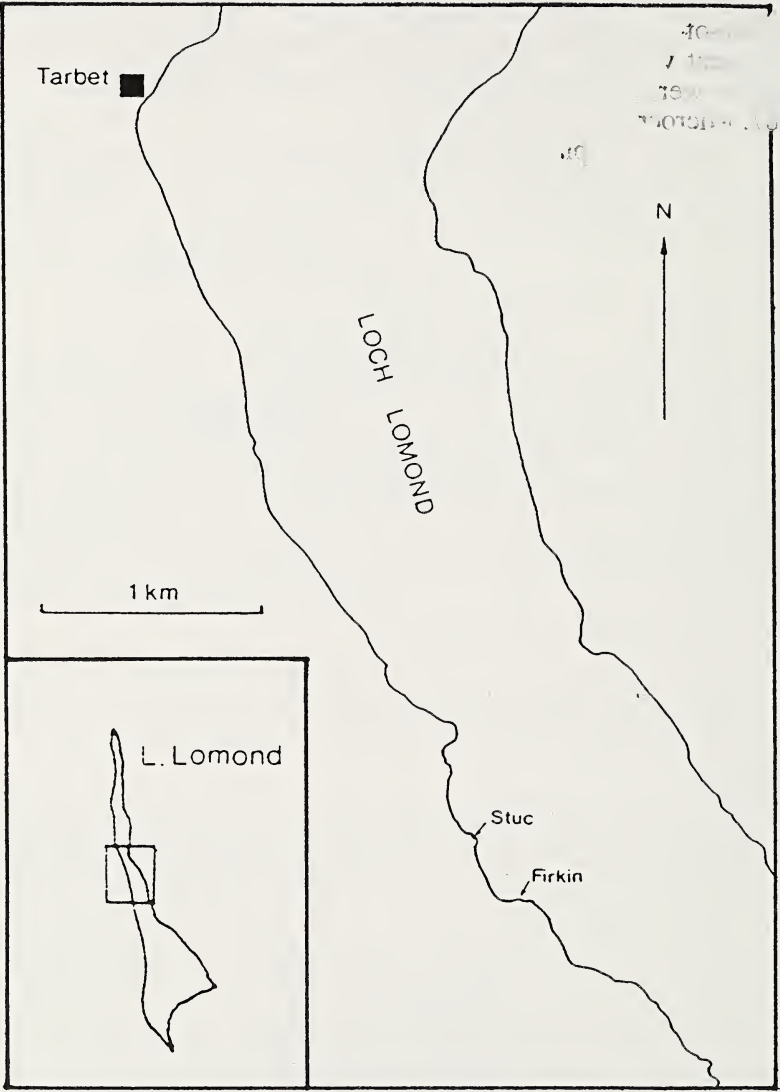


Figure 1 Location of Sampling Sites.

Macroinvertebrates were collected by kicking the substratum in water depths of 15-60cm for two minutes and sweeping a handnet in a figure-eight pattern to catch disturbed animals. An additional minute was spent washing larger stones in the mouth of the net. Five such samples were taken at each site on 25 September 1986 and on 13 May 1987. Crustacea were sampled by making five standardized sweeps with a hand-held plankton net in September 1986 only.

Results

Macroinvertebrates

In September 1986, the macrobenthos of both sites was dominated by oligochaete worms, which made up 67% of the fauna at Stuc and 49% at Firkin (Table 1). Diptera (mainly chironomid larvae) were also abundant, particularly at Firkin. There was a marked difference in diversity between the two sites as measured by the number of distinct taxa and the number of invertebrate families present. The unsilted Stuc supported 42 taxa as opposed to 26 at Firkin and these were distributed among twice as many families. In a previous survey of the littoral macrobenthos of Loch Lomond, Smith *et al.* (1981) found little difference between the number of species on stony and sand/silt shores (41 and 40 respectively), although in contrast to the results reported here, Smith *et al.* found the fauna to be more abundant on silt and sand.

Firkin had no triclads (flatworms) or Malacostraca in September 1986 and had far fewer gastropod molluscs and Trichoptera (caddis flies), particularly *Hydroptila*. Smith *et al.* (1981) also found flatworms, molluscs and caddis flies to be more abundant on stony shores. However, they found the isopod *Asellus aquaticus* to be more abundant on sand/silt. The beetles *Limnius volckmari* and *Oulimnius tuberculatus* were found only at Stuc, whereas *Oreodytes septentrionalis* was restricted to Firkin. *Oulimnius troglodytes*, a rare species in Britain, was present at both sites (Doughty, 1987).

There were notable differences in the naidid worm communities of the two sites, which made up 56% of the total fauna at Stuc and 43% at Firkin in September 1986. According to Learner *et al.* (1978), the presence of deposited inert solids tends to promote the abundance of naidids. Hamilton (1961) also noted an increased abundance of *Stylaria* and *Nais* below discharges from a sand pit. However, there was no evidence of such an increase at Firkin. The naidid community at Stuc was dominated by *Stylaria lacustris*. *Slavinia appendiculata* was more common here and *Nais alpina* was restricted to this site. In contrast,

Table 1. Macroinvertebrates collected in fifteen-minute samples from Stuc (S) and Firkin (F) in September 1986 and May 1987.

	25.9.86		13.5.87	
	S	F	S	F
TRICLADIDA				
<i>Planaria torva</i> (Müller)	3			
<i>Polycelis nigra/tenuis</i>	1			
<i>Dendrocoelum lacteum</i> (Müller)	7		1	
GASTROPODA				
<i>Physa fontinalis</i> (L.)	2			
<i>Lymnaea peregra</i> (Müller)	25	4	6	7
<i>Ancylus fluviatilis</i> Müller	2		1	
OLIGOCHAETA				
<i>Lumbriculus variegatus</i> (Müller)	60	5	29	9
<i>Stylodrilus heringianus</i> Clap.	69	22	43	30
Enchytraeidae	50	11	35	39
<i>Chaetogaster diaphanus</i> (Gruit.)	3			
<i>Specaria josinae</i> (Vejdovsky)		1		
<i>Uncinais uncinata</i> (Orsted)		23		
<i>Nais alpina</i> Sperber	16		1	
<i>Nais barbata</i> Müller	15	326		
<i>Nais communis/variabilis</i>	2	35		
<i>Slavina appendiculata</i> (d'Udekem)	23	1		
<i>Stylaria lacustris</i> (L.)	813	34	4	
<i>Piguetiella blanci</i> (Piguet)	77	97		8
<i>Tubifex ignotus</i> (Stolc)			23	
<i>Limnodrilus hoffmeisteri</i> Clap.			2	
<i>Limnodrilus udekemianus</i> Clap.			1	
<i>Aulodrilus plurisetus</i> Piguet	2	11	3	1
Tubificidae (<i>T. tubifex</i> type)	7	20	8	12
Tubificidae (<i>L. hoffmeisteri</i> type)	6	1	13	
<i>Eiseniella tetraedra</i> (Savigny)			1	
Lumbricidae			1	
HIRUDINEA				
<i>Glossiphonia complanata</i> (L.)				1
<i>Helobdella stagnalis</i> (L.)			2	
HYDRACARINA				
	98	73	12	6
MALACOSTRACA				
<i>Asellus aquaticus</i> (L.)	12			
<i>Gammarus pulex</i> (L.)	1		2	1
EPHEMEROPTERA				
<i>Siphonurus lacustris</i> Eaton			3	
<i>Baetis rhodani</i> (Pictet)	1			
<i>Centroptilum luteolum</i> (Müller)			5	5
<i>Leptophlebia vespertina</i> (L.)			1	
<i>Ephemerella ignita</i> (Poda)		1		

Table 1. (cont.)

	25.9.86		13.5.87	
	S	F	S	F
PLECOPTERA				
<i>Amphinemura sulcicollis</i> (Steph.)		1		2
<i>Nemoura avicularis</i> Morton	7	4		
<i>Diura bicaudata</i> (L.)		1		
<i>Chloroperla torrentium</i> (Pictet)	1		1	
COLEOPTERA				
Halipidae larvae	3			
<i>Nebrioporus depressus elegans</i> Panzer	2	2	2	1
<i>Oredytes septentrionalis</i> (Gyll.)		25	4	21
Hydroporini larvae	1	18		
Gyrinidae larvae			1	
<i>Hydraena gracilis</i> Germar	1			
<i>Limnius volckmari</i> (Panzer)	15		9	
<i>Oulimnius troglodytes</i> (Gyll.)	13	13	3	11
<i>Oulimnius tuberculatus</i> (Müller)	15		11	1
<i>Riolus cupreus</i> (Müller)	5	3		1
TRICHOPTERA				
<i>Hydroptila</i> spp.	68	4	5	1
<i>Plectrocnemia conspersa</i> (Curtis)				1
<i>Polycentropus flavomaculatus</i> (Pictet)	5		9	7
<i>Limnephilus marmoratus</i> Curtis	1			
<i>Limnephilus rhombicus</i> (L.)	4	1		
<i>Limnephilidae</i>	2			1
<i>Sericostoma personatum</i> (Spence)	1		2	
<i>Athripsodes</i> sp.			1	
LEPIDOPTERA				
Pyalidae				2
DIPTERA				
<i>Hexatoma</i> spp.	5		4	1
Ceratopogonidae	3		1	1
Simuliidae	1			
Chironomidae	259	458	136	153
Total abundance	1707	1195	386	324
Number of taxa	42	26	35	26
Number of families	27	14	25	19

Nais barbata was the dominant naidid at Firkin, *N. communis/variabilis* was more common and *Uncinais uncinata* was found only here. *Piguetiella blanci* was common at both sites. Of the other oligochaetes, the Lumbriculidae and Enchytraeidae were more common at Stuc, whereas the Tubificidae were more common at Firkin.

Although most Chironomidae were not identified further, it was noted that the distinctive larvae of the genus *Prodiamesa* (almost certainly *P. olivacea*) were very common at Firkin, but few were found at Stuc. *P. olivacea*, a characteristic burrowing species in sandy substrata (Bryce & Hobart, 1972), was considered to be rare in Loch Lomond by Weerekoorn (1956).

By May 1987, the site at Stuc had become contaminated by mineral solids, which formed a thin layer on the stony bed. However, there was no clear silted zone and the level of contamination was still less than at Firkin, where conditions remained unchanged. Oligochaeta and Diptera remained dominant and the Coleoptera was the only other group to exceed 5% of the total fauna at either site (Table 1).

The total invertebrate abundance was similar at both sites, but the difference in diversity was less pronounced than in September 1986, perhaps as a result of the contamination at Stuc. The abundance of naidids was much reduced at both sites compared with September 1986, but this was undoubtedly a seasonal effect. Enchytraeid worms were now present in similar numbers at both sites, but Tubificidae were more abundant at Stuc.

Among the Coleoptera, although *Oreodytes septentrionalis* and *Oulimnius tuberculatus* were now present at both sites, the former species remained more common at Firkin and the latter at Stuc. *Limnius volckmari* remained restricted to Stuc. As in September, the difference in abundance of the sand-loving chironomid *Prodiamesa olivacea* at the two sites was very obvious. This species comprised 33% of the chironomid fauna at Firkin, but only 2% at Stuc.

Microcrustacea

In contrast to the macrobenthos, the diversities of Cladocera and Copepoda were almost identical at the two sites, although the total microcrustacean abundance was greater at Firkin (Table 2). Copepods were dominant at both sites, comprising around 90% of the total catch. The commonest copepods (*Eudiaptomus gracilis*, *Cyclops abyssorum* and *Mesocyclops leuckarti*) are essentially planktonic forms which

Table 2. Microcrustacea collected in five plankton net sweeps from Stuc (S) and Firkin (F) in September 1986.

	S	F
CLADOCERA		
<i>Daphnia galeata</i> Sars	4	2
<i>Bosmina coregoni</i> Baird (s. lat.)	27	1
<i>Acroperus harpae</i> Baird		1
<i>Alona affinis</i> (Leydig)	3	3
<i>Alona guttata</i> Sars	2	1
<i>Alonella excisa</i> (Fischer)	24	
<i>Alonopsis elongata</i> Sars	25	7
<i>Anchistropus emarginatus</i> Sars	5	1
<i>Chydorus sphaericus</i> (Müller)	1	1
<i>Eurycercus lamellatus</i> Müller	1	
<i>Pleuroxus truncatus</i> (Müller)		1
<i>Rhynchotalona falcata</i> (Sars)	1	151
COPEPODA		
<i>Eudiaptomus gracilis</i> (Sars)	101	669
<i>Eucyclops macruroides</i> (Lilljeborg)	599	1124
<i>Cyclops abyssorum</i> Sars		
<i>Mesocyclops leuckarti</i> (Claus)		
Harpacticoida	2	
Nauplii	33	282
Total abundance	828	2244
Number of species	15	14

may be found inshore (Smyly, 1958). These species are therefore unlikely to be directly affected by deposited mineral solids except when material is re-suspended by wind and wave action or during actual pollution events. Similarly, the presence of planktonic Cladocera (*Daphnia galeata* and *Bosmina coregoni*) is of doubtful significance. It is the truly benthic forms which are most likely to be affected by deposited solids.

At Stuc, the benthic cladoceran fauna was dominated by *Alonopsis elongata* and *Alonella excisa*. The former species tends to favour stony shores, but may also be found on other substrata (Smyly, 1958; Fryer & Forshaw, 1979). *Alonella excisa* is a eurytopic species which was found to be virtually ubiquitous in its occurrence in standing waters on Rum (Rhum) (Fryer & Forshaw, 1979). At Firkin, however, the benthic cladoceran community was totally dominated by *Rhynchotalona falcata*, a species typically associated with sandy substrata (Flössner, 1972; Fryer & Forshaw, 1979).

The occurrence of *Anchistropus emarginatus* at both sites is worthy of note. This species lives and feeds on *Hydra*. It is regarded as rare in Britain (Scourfield & Harding, 1966). There is an old Clyde area record from the now infilled Paisley Canal in 1863 (Scott, 1901). *A. emarginatus* was not found during extensive surveys of standing waters in Tayside (Jones, 1989) or on Rum (Fryer & Forshaw, 1979), nor was it recorded by the author in the course of an intensive survey of the Forth & Clyde Canal (Doughty, 1983).

Conclusions

The littoral macroinvertebrate fauna at Firkin was not as rich as at Stuc, and it seems likely that this difference was due to contamination of the former site by mineral solids arising from road construction. Stuc supported a greater abundance of flatworms, gastropod molluscs, malacostracan crustaceans and caddis flies, and there were clear differences in the composition of the oligochaete, chironomid and beetle communities. Following later contamination by mineral solids, macroinvertebrate richness at Stuc decreased. Microcrustacean diversity at the two sites was very similar, but the cladoceran communities were dominated by different species.

In recent years, running waters in the Loch Lomond catchment have been seriously polluted by mineral solids arising from forestry ploughing operations and from construction of the Glen Fruin haul road serving the Faslane submarine base. In these cases, damage to the invertebrate fauna was evident only where solids deposition was heaviest, and recovery was rapid once spates had scoured away accumulations of silt. In standing waters such as Loch Lomond, the effects of solids deposition, though localized, may be expected to persist for longer, as dispersal of deposited material will take some time. Bays and inlets sheltered from the effects of wave action are likely to be particularly vulnerable. It is therefore important that contractors engaged in civil engineering works, while taking every precaution to prevent contamination of all waters, should be particularly vigilant when working near such areas.

Acknowledgments

I wish to thank Mrs Marion Turner, who assisted with the collection of samples, and Professor D. Hammerton, Director of the Clyde River Purification Board, for permission to publish this work. The views expressed are those of the author and not necessarily those of the Board.

References

- BRYCE, D. and HOBART, A., 1972. The biology and identification of the larvae of the Chironomidae (Diptera). *Entomol. Gaz.* 23: 175-217.
- DOUGHTY, C. R., 1983. The Cladocera (water fleas) of the Forth and Clyde Canal. *Glasg. Nat.* 20: 361-367.
- DOUGHTY, C. R., 1987. *Oulimnius troglodytes* in Loch Lomond. *Balfour-Browne Club Newsletter* 39: 6.
- FLÖSSNER, D., 1972. Krebstiere, Crustacea, Kiemen- und Blattfüsser, Branchiopoda: Fischläuse, Branchiura. *Tierwelt Deutschlands* 60: 1-501.
- FRYER, G. and FORSHAW, O., 1979. The freshwater Crustacea of the island of Rhum (Inner Hebrides)—a faunistic and ecological survey. *Biol. J. Linn. Soc.* 11: 333-367.
- HAMILTON, J. D., 1961. The effect of sand-pit washings on a stream fauna. *Verh. internat. Ver. Limnol.* 14: 435-439.
- JONES, D. H., 1989. The ecology of some microcrustacea from standing waters in Tayside, Scotland. *J. nat. Hist.* 23: 375-406.
- LEARNER, M. A., LOCHHEAD, G. and HUGHES, B. D., 1978. A review of the biology of the British Naididae (Oligochaeta) with emphasis on the lotic environment. *Freshwat. Biol.* 8: 357-375.
- SCOTT, T., 1901. Crustacea. In ELLIOT, G. F. S., LAURIE, M. and MURDOCH, J. B. (eds.) *Fauna Flora and Geology of the Clyde Area*. Glasgow.
- SCOURFIELD, D. J. and HARDING, J. P., 1966. A key to the British species of freshwater Cladocera with notes on their ecology. *Scient. Publ. Freshwat. biol. Ass.* 5: 1-55.
- SMITH, B. D., MAITLAND, P. S., YOUNG, M. R. and CARR, M. J., 1981. The littoral zoobenthos. In MAITLAND, P. S. (ed.) *The Ecology of Scotland's Largest Lochs*. Junk, The Hague.
- SMYLY, W. J. P., 1958. The Cladocera and Copepoda (Crustacea) of the tarns of the English Lake District. *J. Anim. Ecol.* 27: 87-103.
- WEEREKÖÖN, A. C. J., 1956. Studies on the biology of Loch Lomond 1. The benthos of Auchentullich Bay. *Ceylon J. Science (C)* 7: 1-94.

Colour Plates in *The Glasgow Naturalist*

Starting with the next issue, Volume 22, Part 4, *The Glasgow Naturalist* will be able to reproduce a limited number of colour plates. Authors are invited, therefore, to submit suitable photographs to enhance their papers or Short Notes. Colour transparencies are preferable but, where these are unavailable, good prints may be accepted.

Colour printing is an expensive process so authors should submit only photographs which contribute materially to their texts. The final selection of items to be included will be decided by the Publications Committee.

EDITOR

Obituary

ELSIE CONWAY B.Sc., Ph.D. (Liverpool)
President, Andersonian Naturalists of Glasgow,
1967-69

Dr Elsie Conway died at her home in Chester on 22nd July 1992 in her 90th year. As a student at Liverpool University from 1919-23 she received a wide botanical training before Honours specialisation. Her Ph.D. was awarded in 1925 for a thesis of floral morphology under the supervision of Professor J. McLean Thompson. She joined the Department of Botany at Glasgow University in 1938 where she contributed to the teaching at all student levels. Her research interest in the early years and until 1960 was on the Bracken (*Pteridium aquilinum*), as part of a major joint programme on its eradication and control. In the mid-1950s she commenced research on the marine algae and became internationally recognised as an authority on the red algal genus *Porphyra*, with which she made significant contributions to knowledge on the taxonomy and autoecology of the British species. After retirement as Senior Lecturer in 1969 she extended these *Porphyra* studies to centres overseas, especially the many species in the N.E. Pacific region during residence at the University of British Columbia 1969-70 and 1972-74, and on some southern shores whilst at the University of Otago, New Zealand 1970-72. Her Presidential Address to the Andersonian Naturalists in 1969 was on aspects of shore ecology in Scotland.

Ill health in recent years prevented her travelling far from her home, but she retained an active interest in natural history and gave lectures locally on ecology and conservation. She was President of the British Phycological Society 1965-67, and Vice-President of the Botanical Society of Scotland 1967-69. She was elected Fellow of the Royal Society of Edinburgh in 1967.

A. D. BONEY

Additions to the Coleopteran Fauna of Colonsay and Oronsay, Argyllshire (South Ebudes, V.C.102)

D. C. JARDINE

61 Eastwood Grange Road, Hexham, Northumberland
NE46 1UE.

J. CLARKE and P. M. CLARKE

Milbuie, Isle of Colonsay, Argyll PA61 7YR.

Welch (1983) in his summary of Inner Hebridean Coleoptera noted some 297 species for the islands of Colonsay and Oronsay. His list is based on previously published records, records of specimens which he found on the islands and inspected in the collection of others and also some unpublished records from other individuals.

Since the publication of this article *ad hoc* collections of Coleoptera have been made on Colonsay and Oronsay by the authors. The most easily identified species have been determined by the authors but many have also been sent to expert coleopterists for identification.

In all some 50 species have been collected, including the 17 listed below which are not recorded by Welch (*op. cit.*) for Colonsay and Oronsay. All of these species have been previously recorded on at least one of the Inner Hebridean islands but those marked by an asterisk represent new vice county records for the South Ebudes (Vice county 102). Sites where collections were made are indicated in the sketch map Fig. 1.

Species Recorded

CARABIDAE

Notiophilus biguttatus (F.), raised beach, Port Mor (NR3694), 24 June 1991, DCJ.

**Amara lunicollis* Schdt., Colonsay, 1985, J&PMC.

DYTISCIDAE

Dytiscus marginalis L., Loch Fada (NR3895), 1991 and unconfirmed records from Garvard (NR3691) and Oronsay (NR38), 1988, J&PMC.

HISTERIDAE

**Saprinus semistriatus* (Scriba), Colonsay, 1989, J&PMC.

Glasg. Nat. 22 part 3 (1993)

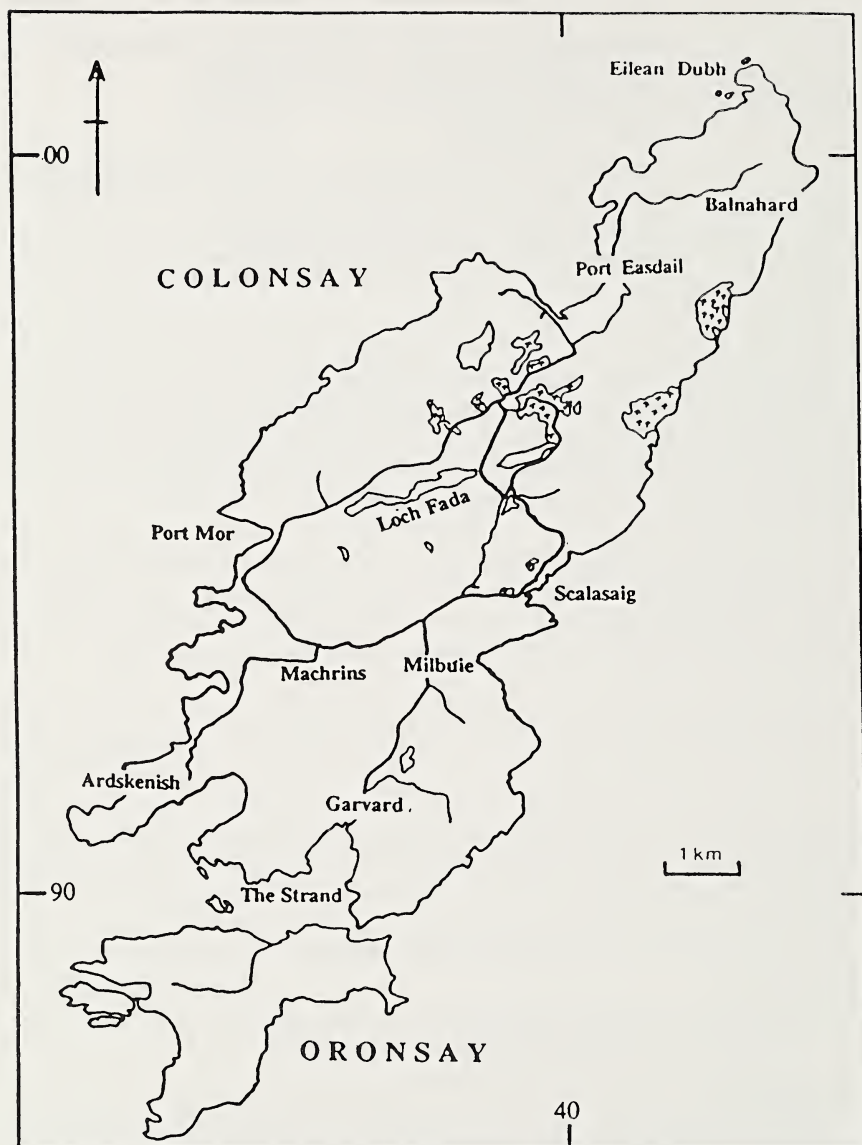


Figure 1. Map of Colonsay and Oronsay to show collecting sites.

SILPHIDAE

Nicrophorus humator (Gled.), Colonsay, 1986, J&PMC.

STAPHYLINIDAE

**Staphylinus ater* Grav., rough grassland, Scalasaig (NR3993), 19 June 1992, DCJ.

GEOTRUPIDAE

Geotrupes stercorarius (L.), Scalasaig (NR3994), 1987, J&PMC. Balnahard (NR4299), 3 October, 1992, DCJ.

**Geotrupes vernalis* (L.), Colonsay 1985, J&PMC.

SCARABAEIDAE

Serica brunnea (L.), machair, Oronsay (NR3688), 23 July 1984 and machair, Machrins (NR3593), 24 June 1992, DCJ.

BYRRHIDAE

**Byrrhus fasciatus* (Forst.), Colonsay, 1990, J&PMC.

COCCINELLIDAE

Aphidecta oblitterata (L.), Colonsay, 1983, J&PMC.

MELOIDAE

Meloe violaceus Marsh., Colonsay, 1984, J&PMC.

CHRYSOMELIDAE

**Plateumaris sericea* (L.), coastal marsh, Oronsay (NR3788), 18 June 1991 and marsh, Ardskenish (NR3491), 15 June 1992, DCJ. This is a technical addition to the fauna as Welch (1983) includes *P. discolor* (Pz.) which has now been deleted in favour of *P. sericea* with which the former is now synonymized (Berge Henegouwen, 1986).

**Chrysolina staphylea* (L.), Milbuie (NR3893), 1987, J&PMC.

**Crepidodera ferruginea* (Scop.), tideline debris, Port Easdail near Balnahard (NR4098), 21 July 1984, DCJ.

Chaetocnema hortensis (Fourcr.), machair, Oronsay (NR3688), 23 July 1984, DCJ.

CURCULIONIDAE

Otiorhynchus arcticus (Fabricius, O.), tideline debris, Eilean Dubh near Balnahard (NM4200), 21 July 1984, DCJ.

Acknowledgments

We are indebted to Howard Mendel, Gordon Simpson and Colin Welch for their assistance by determining the species for some of the specimens collected and for their helpful suggestions which improved an earlier draft of this note. Garth Foster also made valuable comments which improved an earlier draft. We are also grateful to Lord Strathcona and Mrs Colburn, the landowners of Colonsay and Oronsay respectively, and their tenant farmers for their tolerant attitude to natural historians without which much work would not be done on these islands.

References

- BERGE HENEGOUWEN, A. L. van, 1986. Revision of the European species of *Anacaena* Thompson (Coleoptera: Hydrophilidae). *Entomologica scand.* 17: 393-407.
WELCH, R. C., 1983. Coleoptera in the Inner Hebrides. *Proc. R. Soc. Edinburgh* 83B: 505-529.

Book Review

Freshwater Fishes of the British Isles

PETER S. MAITLAND and R. NIAL CAMPBELL
The New Naturalist Series, Harper Collins, London, 1992, 368pp,
21 colour photographs, 200 black and white drawings and
photographs. Paperback, ISBN 0 00 219380 9, £14.99.

It says much about the profile about freshwater fish in Britain that it has taken 75 volumes and 47 years of New Naturalists for this important part of our fauna to be included by this series. Now however, this gap has been plugged by this comprehensive and authoritative account by two authors well placed to provide a British overview.

General chapters on fish form, function, distribution, habitat and the study of fish briefly lay out the basic elements of fish biology for the lay person. Also included are two important chapters setting out a convincing and well argued case for the need for the conservation of fish (a topic that not even many of those who would regard themselves as conservationists have considered).

However the real meat of this book for most people, lies in its comprehensive family by family account of the fish fauna of Britain. Each fish, in each family, is given a separate section and detailed information on identification, reproduction, habitat choice, diet and habits of each species are laid beside anecdotes in the "one-that-got-away" mould from the authors' wide experience that will appeal to the angling readers. Species distribution is dealt with in an appendix by U.K. distribution maps and there is a useful series of size-at-age curves for each species, culled from the literature, which will be of more value to the scientist than to the general reader. The index provided is effective, the bibliography comprehensive and typographical errors minimal.

Criticisms are mainly one of style. The lack of sub-divisions in the individual species descriptions for example into reproduction, feeding, distribution etc., some of which are many pages long, reduces the accessibility of the information and therefore its value as a reference work. The decision to print only "Freshwater Fishes" on the cover with the qualification of "... of the British Isles" found on the fly-leaf must surely prove initially confusing for those who, like me, think that the fly-leaf rarely holds information worth reading.

Despite these minor points this book provides a wealth of detailed information on the basic biology of all of our U.K. freshwater fish species and will be of interest to the angler, naturalist and professional fish biologist. The two chapters on the conservation of fish should be required reading for anyone with a general interest in conservation. Unlike other volumes in the New Naturalist series this is not a book to be read from cover to cover and then parked in a bookcase but a volume that will be continually on and off the shelf. With the paperback version retailing at under £15, the information this book contains represents very good value for money.

COLIN E. ADAMS

Some Recent Records of Bird's-nest Orchid in the Clyde Valley

A. GRAEME WALKER

2 Forge Vennel, Kilwinning, KA13 6UE.

Bird's-nest Orchid (*Neottia nidus-avis*) is an uncommon saprophytic orchid which grows in shady woods with abundant leaf litter and a base rich soil. Despite much searching of its old haunts, there has been no recent sighting within the *Flora of Glasgow* project area and concern has been expressed that this orchid may be declining in West Central Scotland.

However, during recent survey work in the Clyde Valley this plant was encountered on several occasions suggesting that there is a healthy, though wide-spread, population. Along with the records given below, I have also appended brief habitat descriptions. The intention of this is to encourage others to search similar habitats, hopefully expanding our knowledge on the distribution of this elusive plant. The records from the disused railway in the Upper Nethan suggests that there is still potential for a re-discovery in the urban area.

Records 1990-91

Earn Water, Waterfoot, Renfrewshire (V.C.76).

Grid ref NS 567549.

Plant: Solitary spike.

Habitat: Growing on top of the stream bank adjacent to the footpath amongst the exposed roots of a mature *Fagus sylvatica*. Very dense shade. Leaf litter was not abundant.

Calderglen Country Park, East Kilbride (V.C.77).

Grid ref NS 657523.

Plant: 2-3 individual spikes in close proximity.

Habitat: At the bottom of a steep slope of compacted soil at the foot of a cliff. (Near a small water fall.) Dense shade with much exposed soil. Leaf litter (mainly *Fagus sylvatica* and *Acer pseudoplatanus*) only accumulates during the autumn and winter months.

Chatelherault Country Park, Hamilton (V.C.77).

Three distinct sites.

Grid ref NS 736538.

Glasg. Nat. 22 part 3 (1993)

Plant: 2 spikes around 2m apart.

Growing through deep Beech litter which had accumulated in a shallow gully on the gorge side near Cadzow Castle. Medium shade but little plant competition. *Gymnocarpium dryopteris* and *Festuca altissima* can be found on the edges of the gully.

Grid ref NS 735536.

Plant: 1 double spike and 1 solitary spike in close proximity.

Growing through bare soil at path side. With young *Fagus sylvatica*, *Corylus avellana* and *Fraxinus excelsior*. There is a very slight slope and the soil appears well compacted. Medium shade.

Grid ref NS 740527.

Plant: Solitary spike.

In the shade of an old, fallen *Fagus sylvatica* with *Betula* sp. and *Salix caprea* scrub on a stabilising land slip area. The leaf litter is thin with a lot of exposed soil (Shale/clay). The area is relatively brightly lit. *Luzula sylvatica* and *Potentilla sterilis* grow in close proximity.

Avondale, Larkhall (V.C.77).

Grid ref NS 765487.

Plant: 2 spikes above 5m apart.

Habitat: Foot of gorge. Birch/Willow (*Salix caprea*) woodland. Medium shade with only a small amount of litter. The firm soil (Shale/clay) was almost completely covered in Bryophytes. *Pyrola minor* was abundant.

Upper Nethan (V.C.77).

Grid ref NS 804448.

Three sites, dominated by mature Birch Scrub along the bed of the disused railway track between the viaduct and Auchenheath. (Found on a GNHS outing).

Plants: 2 spikes

2 spikes

Multiple spikes at the abutment of the viaduct.

Associated plants included *Epipactis helleborine*, *Pyrola minor* and *Viburnum opulus*. Dense shade with abundant litter and bryophytes.

Stonebyres/Carlinside (V.C.77).

Two district sites.

Grid ref NS 839449.

Plant: Solitary spike.

Growing on the edge of the river bank. The soil was exposed with very little litter. The tree canopy was dominated by Oak with a few Birch close by. Bright light and relatively dry soil conditions.

Grid ref NS846444.

Plant: Double spike.

At the foot of the rock face near a burn in a small gully. The soil was well compacted with a very thin litter layer. The canopy is dominated by Ash and Elm with one small Beech nearby.

The Distribution of Amphibians in Central Region, Scotland

OLIVIA L. LASSIÈRE

Department of Biological and Molecular Sciences,
University of Stirling, Stirling FK9 4LA.

A national amphibian survey, initiated in 1982 and coordinated by Leicester Polytechnic and the Nature Conservancy Council (now English Nature), has shown that there has been a decline in the number and distribution of amphibians in some areas of Britain (Swan, 1991). The plight of amphibian populations both nationally and on a global scale has been the focus of considerable media attention recently (Roe, 1992; Connor, 1992). The decline has been attributed to a number of factors including habitat loss, habitat degradation, disease and even depletion of the ozone layer. The coverage of the British Isles in the national survey has been impressive, but information for Central Region, Scotland is still surprisingly limited. Similarly, published distribution records for Central Region do not cover the entire area (Arnold, 1983; Taylor, 1990).

Up-to-date information on the distribution of populations is needed in order to formulate effective legal protection measures (Boon *et al.*, 1992). Therefore, in March 1992 a survey was initiated in Central Region, under the auspices of the 'Operation Brightwater' campaign to improve the knowledge of amphibian distribution in the region and to involve volunteer surveyors. 'Operation Brightwater' is a three year campaign, organised by the Scottish Conservation Projects' Trust, which aims to raise public awareness about the threats to Scotland's aquatic habitats through practical involvement.

The aims of the survey were:

1. To obtain distribution data for amphibians in Central Region. The Biological Records Centre is presently collating data for a new Atlas of amphibian distribution in the British Isles and requires information in this form.
2. To examine habitat preferences and spawning activity of, and threats to, amphibian populations in Central Region.

Glasg. Nat. 22 part 3 (1993)

3. To involve volunteers in a scientific survey, using non-destructive techniques.
4. To realise the main objective of the 'Operation Brightwater' campaign by raising public awareness about the more general threats to the freshwater environment in Scotland through practical involvement.

Methods

The survey area included all 49 of the 10km squares covered by the administrative area of Central Region. The region is bordered by Loch Lomond to the west, the Firth of Forth to the east, Loch Tay to the north and the Carron Valley to the south (Figs. 1-5).

The field techniques described in the Survey leaflet and record form were based on the non-destructive methods described by Oldham & Swan (undated), Perth Museum & Art Gallery (1989), Evans (1988) and the British Herpetological Society (undated). A simple illustrated key based on that by Green (undated) was provided to aid species identification for the eggs, young and adults of Frogs, Toads and Newts. Recorders were asked to search for amphibians during daylight hours or at night with the aid of a torch. Estimations of population size were made on the basis of numbers of clumps of spawn for Frogs, an evening head count at breeding sites for Toads and numbers of adults revealed by shining a torch into the water of a potential site, in the case of Newts.

Recorders were asked to note the following for each observation on the record form provided:

- (1) site name or nearest place name; (2) water type; (3) grid reference; (4) date and time of day of observation; (5) amphibian species and stage; (6) presence of fish species; (7) surrounding land use; (8) water use; (9) evidence of pollution and/or litter.

Records were transferred from the recording forms into a specially designed relational database using 'DBase Mac' software on 'Macintosh' hardware at Stirling University. The altitude of each site, to the nearest 10m above sea level, was determined from the current 1:50,000 Ordnance survey maps. On the basis of the site types described by the recorders, the following categories were devised:

Natural features:

- (1) river; (2) standing water; (3) wet ground.

Man-made features:

(1) industrial; (2) recreational/ornamental; (3) terrestrial; (4) buildings.

The preferences of the amphibian species for these habitat types were examined. Distribution maps of the records for each amphibian species found were drawn with records from the *Distribution maps of the amphibians and reptiles of the British Isles* (Arnold, 1983) superimposed. The distribution of Frogs and Toads in relation to altitude was compared using a Mann-Whitney 'U' test. The distributions of Palmate and Smooth Newts were tested similarly.

Results

Between 23 February 1992 and 1 September 1992, 253 recorders from a diverse range of groups returned their amphibian sighting records. For the purposes of the survey, a single record consisted of a site location, date and a sighting of any stage of an amphibian species.

A total of 441 amphibian records from 286 sites, ranging in altitude from 0 to 350m above sea level, was collected (Table 1). Records from 31 of the 49 ten kilometre grid squares in Central Region were returned. The best square was NN60 around Callander where 47 people collected records for Frogs, Toads and Newts at 41 sites. The square around Kippen (NS69) had the most diverse species range with Frogs, Toads and both Palmate and Smooth Newts being recorded. The site type preferences for each species are summarised in Table 2.

Common Frog (*Rana temporaria* L.)

A total of 339 records was collected from 264 sites in 31 ten kilometre squares. Twelve of these squares are new records for the region. The sites ranged in altitude from 0 to 350m above sea level (see Table 1).

First sightings

Spawn was first seen on 23 February 1992 on the hills north of Callander (NN 638103, Alt. 190m) and in ditches in Loch Ard Forest (NS 509996, Alt. 90m; NS 502992 Alt. 80m; NS 489998, Alt. 40m). Tadpoles were first seen on 8 March 1992 in a forest ditch by Arntamie, north west of the Lake of Menteith (NN 556010, Alt. 80m). Adults were first seen on 25 February 1992 by the Sports Centre on Stirling University campus (NS 806965, Alt. 20m).

Table 1 Summary of Amphibian Records in the 1992 Central Region Survey

Species	No. of records		No. of sites		Range of No. of 10km ²	
	Total	A	E/Y	Total	A	E/Y
Common Toad (<i>Bufo bufo</i>)	74	50	23	55	43	21
Common Frog (<i>Rana temporaria</i>)	339	69	267	264	56	238
All Newts (<i>Triturus</i> spp.)	27	22	6	23	21	6
Palmate Newt (<i>Triturus helveticus</i>)	10	10	0	10	10	0
Smooth Newt (<i>Triturus vulgaris</i>)	4	4	0	3	3	0
Total	441	-	-	286	-	-
					0-260	18
					0-350	31
					10-220	14
					20-200	7
					30- 80	2
					0-350	31
						18

A record consists of a site location, date and sighting of any stage of amphibian species.

A = Adult, E = eggs, Y = tadpoles or efts. Total = No. of 10km squares with records.

New = 10km square records not seen prior to or since 1960 on Arnold 1983 Atlas.

in altitude from 20 to 200m above sea level and from 30 to 80m

Table 2

Summary of Amphibian Site Types in the 1992 Central Region Survey

Species	Stage	Site type: Number of records						
		Natural features			Man-made features			
		R	SW	WG	I	T	O	B
Common Toad (<i>Bufo bufo</i>)	E/Y	3	3	0	7	1	9	0
	A	5	10	0	9	9	12	4
Common Frog (<i>Rana temporaria</i>)	E/Y	18	44	40	11	55	53	0
	A	6	4	11	5	14	22	2
All Newts (<i>Triturus</i> spp.)	E/Y	0	1	0	0	0	4	0
Palmate Newt (<i>Triturus helveticus</i>)	A	0	2	1	0	0	8	0
Smooth Newt (<i>Triturus vulgaris</i>)	A	0	0	0	0	0	2	0

A = Adults, E = eggs, Y = tadpoles or efts.

R = river, SW = standing water, WG = Wet ground, I = industrial, T = terrestrial, O = ornamental, B = buildings.

Numbers

Two thousand nine hundred and ninety clumps of spawn, equivalent to approximately 4.5 million eggs, 4939 tadpoles and 1706 adult Frogs were recorded. Up to 20m² of spawn was seen in a bog pool south west of Callander (NN 6106), over a thousand tadpoles were seen in a puddle in Glen Ample (NN 600194) and more than 1000 adult Frogs were seen in an old curling pond in Buchlyvie (NS 562937).

Site preferences and distribution

The Common Frog is widely distributed throughout Central Region and is apparently breeding successfully in both urban and rural habitats (Fig. 1). They tended to lay their spawn anywhere where there was water, however temporary, and the popular breeding sites included roadside and forest ditches (44 records), puddles (16 records), garden ponds (23 records), lochs (17 records), marshy areas (30 records), reservoirs (13 records) and riverside pools or streams (12 records). Some of the more surprising spawning sites included a rain puddle in the branch of a tree near to Cardross (NS 608978) and an old bucket, less than 50cm across in one of the University Quadrangles (NS 807963).

Adult Frogs were most commonly found in ditches (6 records), garden ponds (15 records) and marshy areas (7 records). Some Frogs were so eager to spawn that they were seen walking through the close of a tenement in Carronshore to reach the pond in the back garden (NS 8983). Others were found indoors in larders and toilets.

Common Toad (*Bufo bufo* L.)

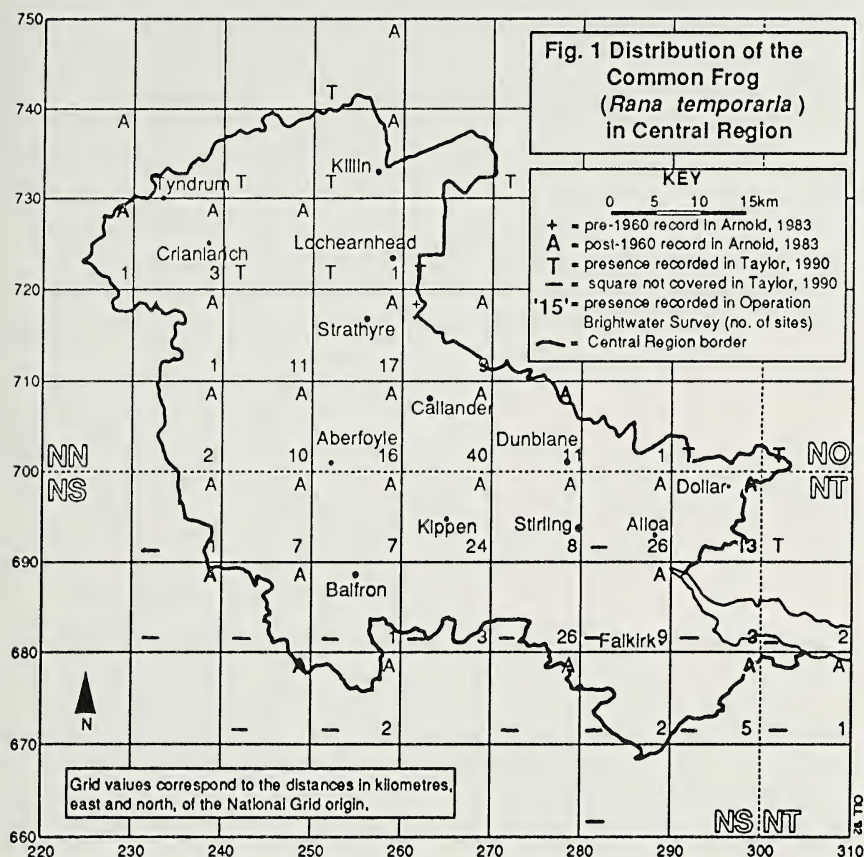
A total of 74 records was collected from 55 sites in 18 ten kilometre squares. Ten of these squares are new records for the region. Sites ranged in altitude from 0 to 260m above sea level (Table 1).

First sightings

Spawn was first seen on 18 March 1992 in Overton Reservoir, west of Denny (NS 765835, Alt. 220m). Tadpoles were first seen on 17 April 1992 in a forest ditch north of Loch Ard (NN 4502). Adults were first seen on 22 February 1992 squashed on a road by Logie Kirk and in a porch in Blairlogie (NS 825965, Alt. 30m).

Numbers

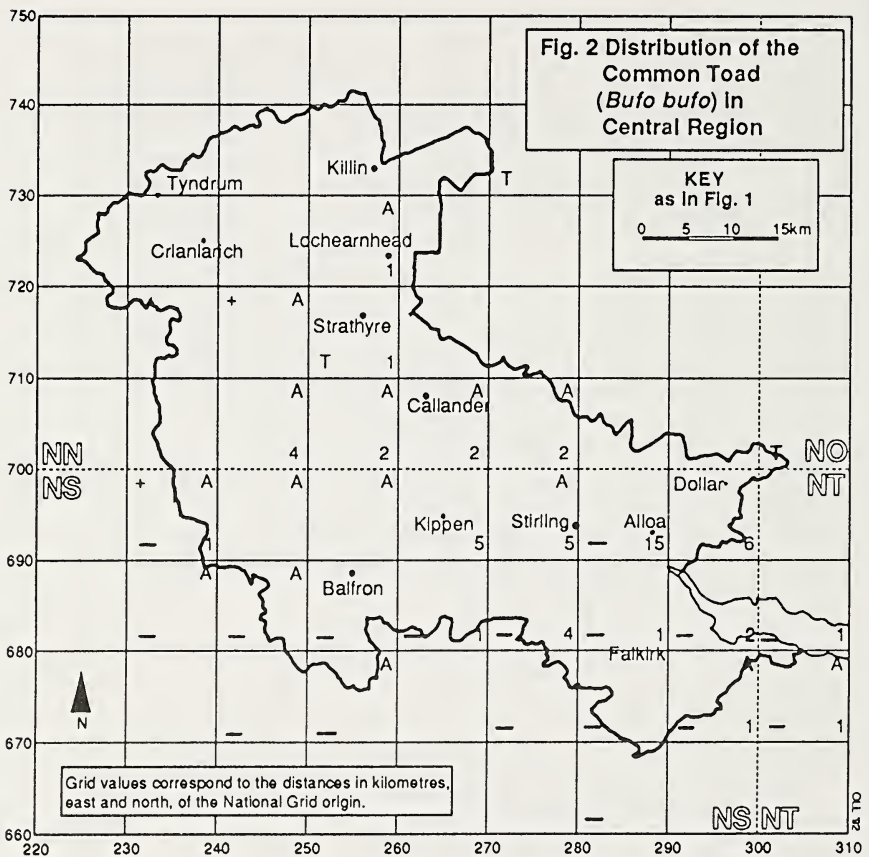
Only 75 strings of spawn and very few tadpoles were recorded. The



dearth of the latter was due to the difficulty in distinguishing them from Frog tadpoles. A total of 559 adult Toads was seen which included 500 adults mating in a mill pond east of Bo'ness on the 23 March 1992 (NT 023804).

Site preferences and distribution

The Common Toad is fairly widely distributed throughout the lowland areas of Central Region (Fig. 2). The most popular Toad spawning sites included garden ponds (3 records), old curling and mill ponds (4 records) and reservoirs (5 records). Spawning was restricted to sites with underwater vegetation, around which they lay their spawn. At one site the spawn had been laid on the submerged branches of a dead pine tree (NN 501005).



Adult Toads were most often seen in garden ponds or curling ponds (6 records), on roads (9 records) and in lochs and reservoirs (15 records). Some of the more surprising sightings of adult Toads included a garage in Dunblane (NN 792014), a porch in Blairlogie (NS 8296), a stairwell at Stirling University (NS 807963) and inside a wader at Loch Lomond side (NS 376960). Casualties included squashed Toads on the road, probably en route to their breeding sites and large numbers of corpses around a lochan in Loch Ard Forest (NS 4997), possibly the result of heron predation.

Palmate Newt (*Triturus helveticus* Razoumowski), Smooth Newt (*T. vulgaris* L.) and Great Crested Newt (*T. cristatus* Laurenti).

A total of 27 records was collected from 23 sites in 14 ten kilometre

squares. Six of these squares are new records for the Palmate Newt and two squares are new records for the Smooth Newt in the region. No Great Crested Newts were found. Records for Palmate Newts ranged in altitude from 20 to 200m above sea level and from 30 to 80m for Smooth Newts (Table 1).

First sightings

Spawn was first seen on 18 March 1992 in a bog near California, south of Falkirk (NS 8976). Efts were first seen on 11 April 1992 in a garden pond near Dollar (NS 9569). Adults were first seen on 1 March 1992 in a garden pond in Bo'ness (NT 001802, Alt. 90m).

Numbers

Spawn was rarely seen: the eggs are laid individually on the leaves of under-water plants and are difficult to see from above. Dozens of adult Palmate Newts were seen in Kippen Curling Pond (NS 656944).

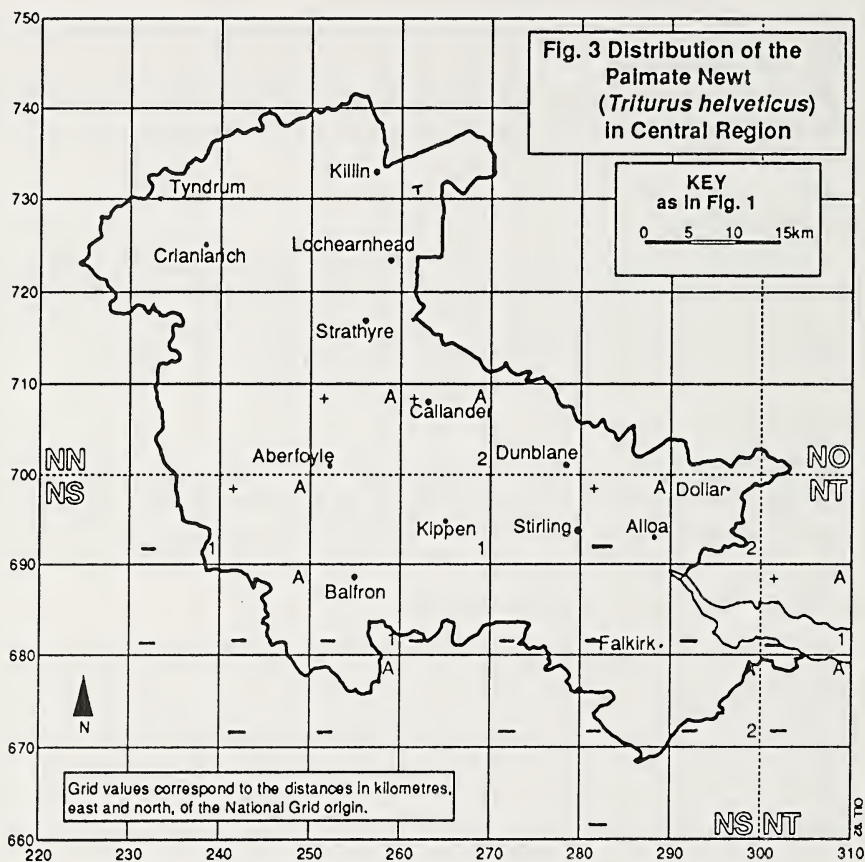
Site preferences and distribution

Both the Palmate and Smooth Newts were not particularly common or widespread in Central Region (Figs. 3 & 4) but this is most probably a function of their cryptic habits rather than their true distribution. Sites known to be formally inhabited by the Great Crested Newt (Fig. 5) were visited but none was seen. Newt spawn and/or efts were found in bog pools (1 record), curling ponds (1 record), garden ponds (3 records) and lochs (1 record). Adult Newts were found in ponds (15 records: 9 garden, 2 curling, 1 drowning, 3 others), lochs and reservoirs (5 records) and meadows (1 record).

Effects of altitude on amphibian distribution

The range of altitudes at which each species was recorded are shown in Table 1. Frogs are clearly the most widely distributed in Central Region in this respect. The Toads, Palmate and Smooth Newts are all apparently lowland species.

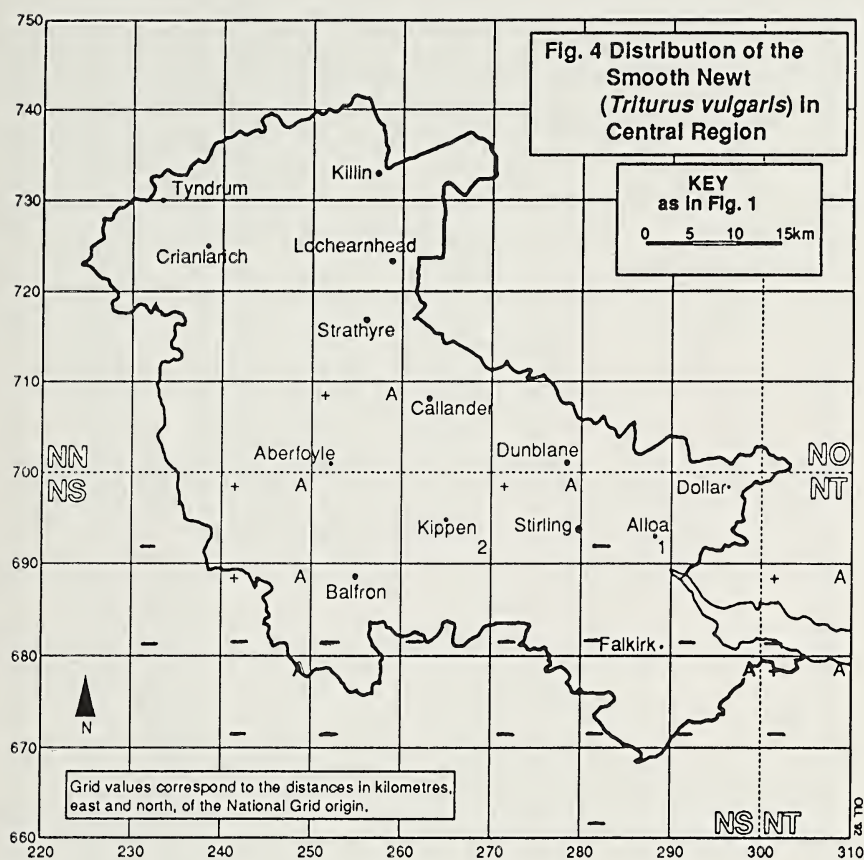
The median altitude of Frog spawning sites was significantly greater than that of Toad spawning sites in the survey ($P=0.039$) (Fig. 6). Similarly, the median altitude of Frog adult sightings was significantly greater than that of Toad adult sightings in the survey ($P=0.024$) (Fig. 6). In contrast, the median altitudes for adult Palmate Newt and adult Smooth Newt sightings were not significantly different ($P=0.201$).



Shared habitats

A number of sites had several species of amphibian present. Twenty sites had both Frogs and Toads, eight sites had Frogs and Newts and four sites were inhabited by Frogs, Toads, and Newts. No sites were inhabited by Toads and Newts only. In general, sites with Newts present were mostly ponds, particularly those in gardens. Sites inhabited by both Frogs and Toads were more numerous and varied.

A number of recorders also noted the presence of fish at amphibian sites. Frogs were found in 4 garden ponds stocked with goldfish (*Carassius auratus* Linnaeus) and golden orfe (*Leuciscus idus* Linnaeus). One quarry (NT 002794) where Frog spawn was seen, was inhabited by perch (*Perca fluviatilis* Linnaeus) and a curling pond

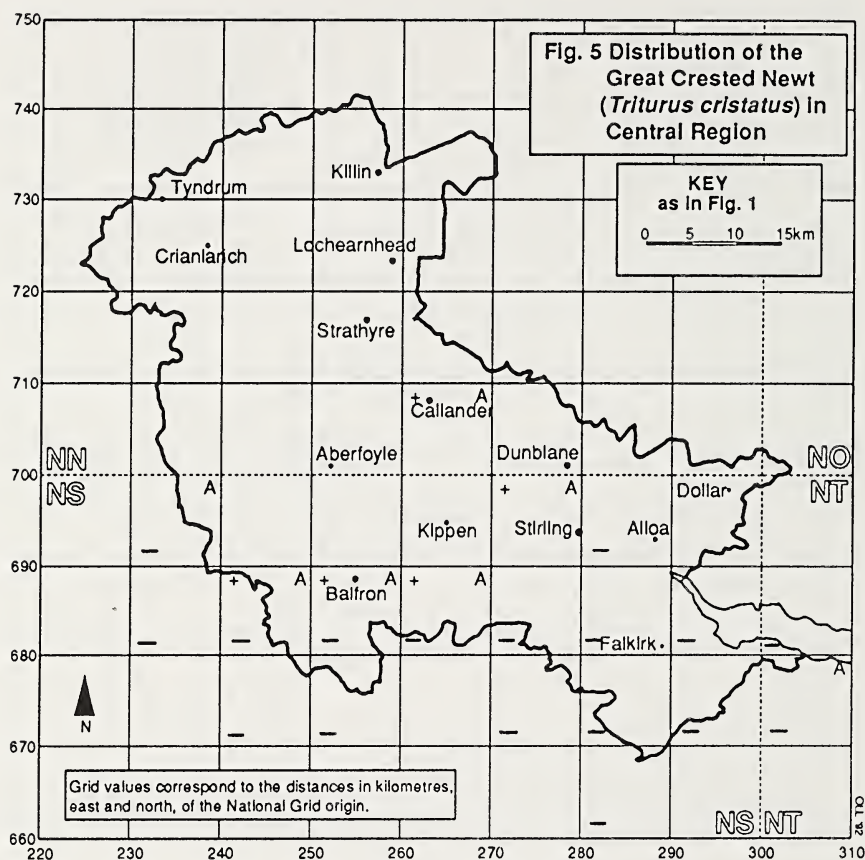


(NS 976802) supporting populations of pike (*Esox lucius* Linnaeus) and three-spined sticklebacks (*Gasterosteus aculeatus* Linnaeus) was used as a Frog breeding site. Frogs and Toads were found in a garden pond (NS 784833) containing goldfish and in a mill pond (NT 023804) containing three spined sticklebacks and perch. One reservoir (NS 765835) which was stocked with brown and rainbow trout (*Salmo trutta* Linnaeus and *Oncorhynchus mykiss* Walbaum) supported populations of Frogs, Toads and Newts.

Discussion

Distribution of amphibians in Central Region

The Biological Records Centre at Monks Wood, established its



national recording scheme for amphibians and reptiles in 1964 and has 2300 computerised data holdings (Harding & Sheail, 1992). The latest national amphibian survey, funded by the Nature Conservancy Council and coordinated by Dr Mary Swan (Leicester Polytechnic) has been running since 1982. The coverage of Central Region by this survey is limited to only 7 records between 1986 and 1990 (Alastair Sommerville, personal communication). Similarly, the published distribution data (Arnold, 1983; Taylor, 1990) are patchy. The present survey has significantly improved our knowledge of amphibian distribution in the region (Figs. 1-4) and included sightings of four of the six species native to Britain (Beebee, 1973). No Natterjack Toads (*Bufo calamita* Laurenti) or Great Crested Newts (*Triturus cristatus* Laurenti) were seen. An old record for the Natterjack Toad in Balquhider (NN 52) is

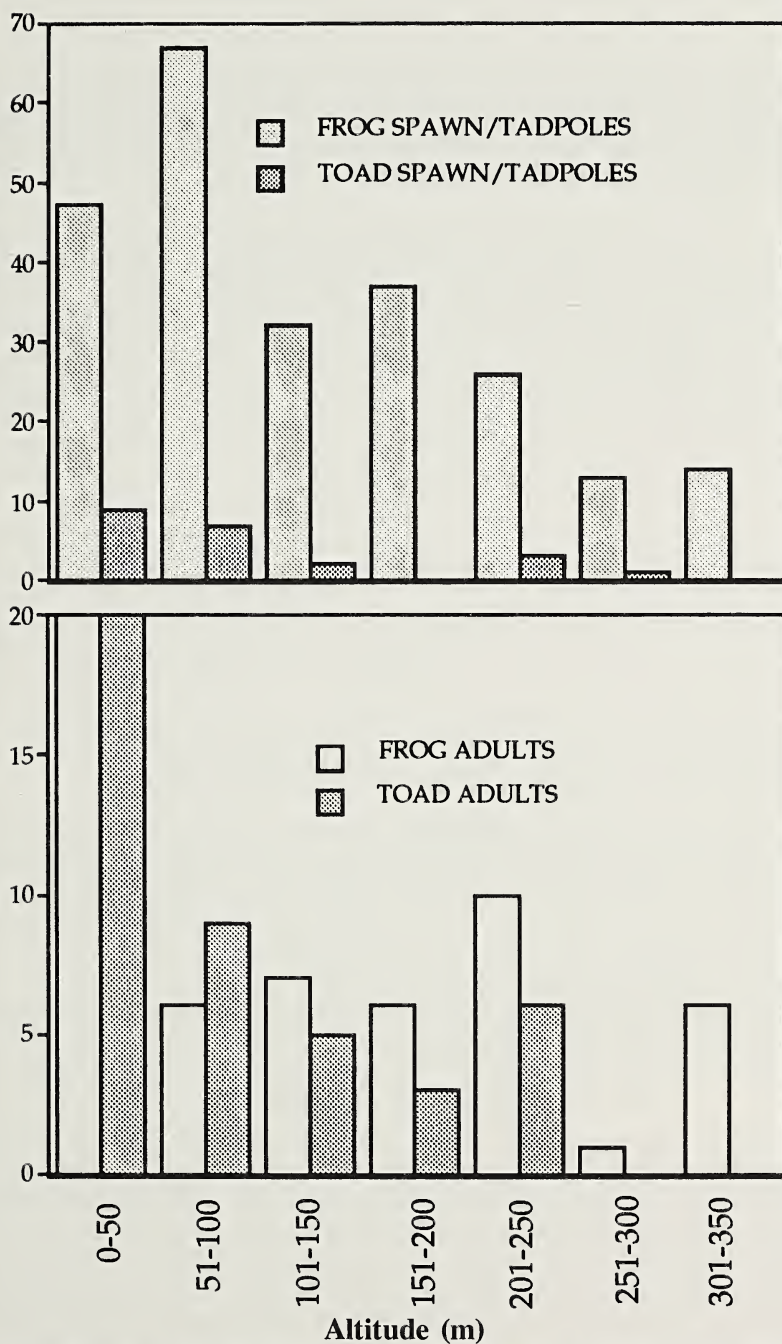


Fig. 6 Distribution of Frog and Toad Adults and Young with respect to Altitude.

doubtful (Henderson, 1911). However, extant populations of Great Crested Newts have been reported from areas bordering Central Region (Hamilton, 1978; Taylor, 1990; Betty Smith, personal communication; Mary Konik, personal communication).

The last sighting of Great Crested Newts in Central Region was a single eft in a loch in July 1972 (NS39) (Henry Arnold, personal communication). All other published records pre-date this (Brown, 1901; Brown & Lumsden, 1895; Evans, 1894; Russel Hunter *et al.*, 1959). Despite a number of these sites being visited by the author, no Great Crested Newt adults were found. The apparent absence of this species in Central Region can be attributed to several factors. The Great Crested Newt is crepuscular in habit (Dolmen, 1983) and has been reported to prefer deep ponds, with sizeable areas of open water (Taylor, 1983). Adult Great Crested Newts, living in a Welsh upland pool, tended to stay near to the centre of the water in spring and only moved towards the perimeter between July and September (Griffiths & Mylotte, 1987). Our survey technique, which was confined to observations of the shallows at the edges of potential sites, the limited number of twilight expeditions and the lack of records for any adult Newts in either July or August probably reduced the chances of finding any adult Great Crested Newts. A more intensive survey using a number of survey techniques e.g. netting and bottle trapping would be necessary to assess the true status of Great Crested Newts in Central Region.

The distributions of amphibians in Central Region followed patterns similar to the national (Arnold, 1983) and regional distributions (Hamilton, 1978; Taylor, 1990). Frogs were widespread and very common; Toads were common and less widespread; and Newts were the least common. Since this is the first comprehensive survey of Central Region amphibians it is not possible to assess whether any declines in their populations have occurred. However, the data can now be used as baseline information for monitoring future population changes.

Effect of altitude

Frogs were the most widely distributed amphibians in Central Region with respect to altitude. Even the smallest highland pools have been reported as being spawning sites, e.g. pools on Beinn Dubhchraig at an altitude of 900m (Marshall, 1889; Lassi re, personal observation, April 1991). This observation does not break any records as frogs have been found spawning as high as 2500m above sea level in the Bernese Oberland, Switzerland (Brodmann, 1981; Lassi re personal observation, June 1988).

Toads appear to be a lowland species in Central Region and Taylor (1990) describes a similar distribution in Perthshire. The lack of underwater vegetation in highland pools and the lower ambient temperatures may influence the distribution of toads and their spawning sites in the survey area.

Both Palmate and Smooth Newts were found in lowland areas of Central Region. The Palmate Newt has been described as a 'montane' species (Taylor, 1983) although a recent study in the Peak District, England, found Palmates mostly below 305m and Smooth Newts on higher ground (Yalden, 1986). The present survey gave no indication of a difference in distribution in relation to altitude of these species.

Habitat preferences

Frogs can spawn in very shallow waters without underwater vegetation and consequently were found in a wide range of habitats in Central Region. Strijbosch (1979) found frog spawn in waters only 10mm deep. Their choice of fairly ephemeral habitats e.g. puddles and marshy areas, is well known (Taylor, 1990).

The survival rate of young from this type of spawning site is unknown. By contrast, Toads were confined to sites with underwater vegetation or structures around which they wrapped their spawn. Strijbosch (1979) found that Common Toads will lay their spawn on any underwater structures including inanimate objects like wire netting. Newt spawning sites, like those of Toads, were restricted to those with underwater vegetation.

Although there was probably a sampling bias towards garden ponds, these man-made habitats were obviously important sites for Frogs, Toads and Newts in Central Region. Surveys in England have also recognised the importance of such sites, e.g. in Sunderland, Tyne and Wear (Banks & Laverick, 1986) and Brighton, Kent (Beebee, 1979).

Mixed populations of amphibians (32 sites) or amphibians with fish (9 sites) were fairly common in Central Region. Hamilton (1978) found that over 40% (95 of 224) of breeding sites in Lothian Region had mixed combinations of amphibian populations. Clausnitzer (1983) noted that amphibians in pools in Germany are able to coexist with fish if there is plenty of vegetation and large areas of shallow water and fish stocking level is not too high.

Timing of spawning

The observed first dates of spawning in Central Region with Frogs earliest. Toads next and Newts latest, followed the National pattern (Oldham & Swan, undated). Due to the mild winter, Frogs were first seen spawning 20 days earlier than in 1991 (Lassière, personal observation, 13 March, 1991 at NS 771858). The majority of spawning records were in March and the first half of April, in contrast to the situation in Perthshire in 1989 where the breeding pattern was similar, but delayed by two weeks (Taylor, 1990).

It appears that the mild winter did not affect toad spawning to the same extent. Toads were first seen spawning in Central Region on 17 April in 1991 (Lassière, personal observation, NS 557870), one day earlier than in 1992. The date of first spawning in 1992 may not be representative since adults were first seen as early as 22 February 1992. In Perthshire, the first records of toad spawn came on 26 March 1989 (Taylor, 1990).

Recommendations

Future surveys

A single season survey can yield only a snapshot impression of the status of amphibian populations. In the Copenhagen area of Denmark, a long term survey has revealed a decline in numbers due to eutrophication and the introduction of fish and ducks. Reports from this survey are used as part of the regional and local nature conservation planning (Holman & Wederkinch, 1988). In Sweden an amphibian mapping programme has been running since 1984 and has over 3000 observations in its database (Nilson & Andren, 1988). This type of strategy should be applied in this country.

In the light of reports of fatal, bacteriological infections of Frogs called "Red leg" in southern England (Roe, 1992), signs of such disease should be looked out for in populations throughout the U.K. Concern about this problem is so great that a Frog Mortality Project has been set up to collate information (Address: Frog Mortality Project, P.O. Box 1, Halesworth, Suffolk IP19 8AW).

Acknowledgments

This survey was funded entirely by the Scottish Conservation Projects' Trust as part of their 'Operation Brightwater' campaign. I am grateful to those who offered advice during the planning stages and to

Valerie Johnston who did an impeccable job with the publicity campaign. I would also like to thank the volunteers without whom the survey would have been impossible and the land owners who permitted access to their land.

References

- ARNOLD, H. R. (Ed.), 1983. *Distribution maps of the amphibians and reptiles of the British Isles*. Biological Records Centre: Institute of Terrestrial Ecology.
- BANKS, B. & LAVERICK, G., 1986. Garden ponds as amphibian breeding sites in a conurbation in the north east of England (Sunderland, Tyne & Wear). *Herpetol. J.* 1: 44-50.
- BEEBEE, T. J. C., 1973. Observations concerning the decline of the British Amphibia. *Biol. Conserv.* 5: 20-24.
- BEEBEE T. J. C., 1979. Habitats of the British amphibians (2): Suburban parks and gardens. *Biol. Conserv.* 15: 241-257.
- BOON, P. J., MORGAN, D. H. W. & PALMER, M. A., 1992. Statutory protection of freshwater flora and fauna in Britain. *Freshwater Forum*, 2: 91-101.
- BRITISH HERPETOLOGICAL SOCIETY, Undated. *Surveying for Amphibians: a practical guide*. International Centre for Conservation Education.
- BRODMANN, P., 1981. *Die Amphibien Mitteleuropas*. Tierschutz Baselland und Schweizer Tierschutz.
- BROWN, A., 1901. in ELLIOTT, G.F.S. et al. *Fauna, flora and geology of the Clyde area*. British Association. Glasgow.
- BROWN, A. & LUMSDEN, J., 1895. *The natural history of Loch Lomond and neighbourhood*. Glasgow: David Bryce & Son.
- CLAUSNITZER, H. J., 1983. Zum gemeinsamen Vorkommen von Amphibien und Fischen. *Salamandra*, 19: 158-162.
- CONNOR, S., 1992. Nature croaks her doomsday warning. *Independent on Sunday, The Sunday Review*. 30/8/92.
- DOLMEN, D., 1983. Diel rhythms of *Triturus vulgaris* (L.) and *T. cristatus* (Laurenti) (Amphibia) in central Norway. *Gunneria*, no.42, pp34.
- EVANS, G., 1988. Amphibian survey methods. *The Herptile*, 13: 64-67.
- EVANS, W., 1894. The reptiles and batrachians of the Edinburgh district (XXXIII). *Proc. R.phys. Soc. Ed.* 12: 490-526.
- GREEN, D., Undated. *Amphibian Key*. (Part of Amphibian survey information from Drs Oldhan & Swan, Leicester Polytechnic.)
- GRIFFITHS, R. A. & MYLOTTE, V. J., 1987. Microhabitat selection and feeding relations of smooth and warty newts, *Triturus vulgaris* and *T. cristatus*, at an upland pond in mid-Wales. *Holarctic Ecology*, 10: 1-7.
- HAMILTON, E., 1978. *The pond survey of the Lothians*. Scottish Wildlife Trust unpublished report, 30pp.
- HARDING, P. T. & SHEAIL, J., 1992. The Biological Records Centre: a pioneer in data gathering and retrieval. In *Biological recording of changes in British wildlife*. Institute of Terrestrial Ecology symposium no. 26, 5-19, London: H.M.S.O.
- HENDERSON, T. B., 1911. In Proceedings of the Society, 6th meeting, 28 February, 1911. *Glasg. Nat.* 3: 122.
- HOLMAN, M. & WEDERKINCH, E., 1988. Monitoring amphibian populations in the Copenhagen Region. *Mem. Soc. Fauna Flora Fenn.* 64: 124-128.
- MARSHALL, E. S., 1889. Occurrence of frogs at high levels. *Scott. Nat.* 10: 96.
- NILSON, G. & ANDREN, C., 1988. Mapping of Swedish Reptiles and Amphibians. *Mem. Soc. Fauna Flora Fenn.* 64: 92-93.

- OLDHAM, R. S. & SWAN, M. J. S., Undated. *Amphibian survey methods*. Unpublished survey pack from the National Amphibian Survey team at Leicester Polytechnic.
- PERTH MUSEUM & ART GALLERY, 1989. *Frogs and other amphibians: a local survey for 1989*. Leaflet.
- ROE, N., 1992. The mystery killer in the garden pond. *The Independent* 29/8/92.
- RUSSELL HUNTER, W., SLACK, H. D. & RUSSELL HUNTER, M., 1959. The lower vertebrates of the Loch Lomond district. *Glasg. Nat.* 18: 84-90.
- STRIJBOSCH, H., 1979. Habitat selection of amphibians during their aquatic phase. *Oikos* 33: 363-372.
- SWAN, M. J. S., 1991. Report on the National Amphibian survey. *Protecting Britain's Ponds: pond conservation in the 1990's. A one day conference*, Oxford Polytechnic, 4/9/91.
- TAYLOR, I. R., 1983. The natural history of newts. *Scottish Wildlife* 19: 12-14.
- TAYLOR, M. A., 1990. *Amphibian Survey 1989 Results*. Unpublished report from the Natural Sciences Section of the Perth Museum and Art Gallery, 8pp.
- YALDEN, D. W., 1986. The distribution of newts, *Triturus* spp. in the Peak District, England. *Herpetol.J.* 1: 97-101.

Cotoneaster Update

P. MACPHERSON¹ and E. L. S. LINDSAY²

¹15 Lubnaig Road, Glasgow G43 2RY.

²18 Monreith Road, Glasgow G43 2NY.

In the year since we submitted the previous article on Cotoneasters (Macpherson and Lindsay 1992) we have recorded further species, increased our knowledge of the distribution of plants previously recorded and had made available to us records made by others while recording for the *Flora of Glasgow*. There have also been some losses.

As before we have concentrated on V.C.77 (Lanarkshire) the vice county for which one author (PM) is plant recorder but on this occasion give also records from the adjacent vice counties as indicated.

Additional Species

The first sighting of each of the additional species was a new V.C. record. As before, the illustrations have been drawn from fresh local material.

C. apiculatus (Fig. 1)

A tiny plant grows alongside a wall at the edge of a residents' car park in Shawlands (V.C.76).

C. conspicuous (Fig. 2)

In the autumn of 1991 a moderately sized plant with three seedlings within a range of 30 yards was seen on gravelly waste ground just west of the Kingston Bridge. These have persisted and are appreciably larger in 1992. In May 1992 two further plants were noted on bare waste ground at the site of the Glasgow Garden Festival, three quarters of a mile to the west.

C. integrifolius (Fig. 3).

This species used to be named *C. microphyllus*, and known as Rockspray, but its vernacular name also has now been changed to Small-leaved Cotoneaster. It is a feature of planted borders along Clyde Street west of the Victoria Bridge. A seedling grows between granite setts on the nearby Custom House Quay.

C. sternianus (Fig. 4).

One moderately sized and two smaller plants were detected in 1992 at the edge of waste ground at Cessnock.

C. sp. ser Bullati

A plant unlike any other recorded was seen in 1992 growing on waste ground at the Garden Festival site. Although two feet tall, it has neither flower nor fruit and cannot be identified more accurately at the present time. Pending a definitive identification it has not been illustrated.

Further records of species previously recorded

C. bullatus

We have seen this plant in two more sites during 1992 with three further records having been made by the *Flora of Glasgow* recording team. In addition we have known of another plant since 1989 in a lane at Langside (V.C.76).

C. dielsianus

A plant appeared spontaneously on a path under a tree in 1990 in a garden in Newlands (V.C.76).

C. franchettii

In the autumn of 1991 a plant was seen at a roadside fence in Hutchesontown and one at Kingston in 1992.

C. frigidus x *C. salicifolius* (= *C. x watereri*)

Additional records are from a roadside fence at Hutchesontown and from Kelvinhaugh where the plant grows alongside the wall of an old industrial site.

C. hjelmqvistii

In 1992 a single seedling was seen growing adjacent to a wall in Shawlands (V.C.76), a totally different habitat from its other site, the tops of the wooden piles at Custom House Quay.

C. horizontalis

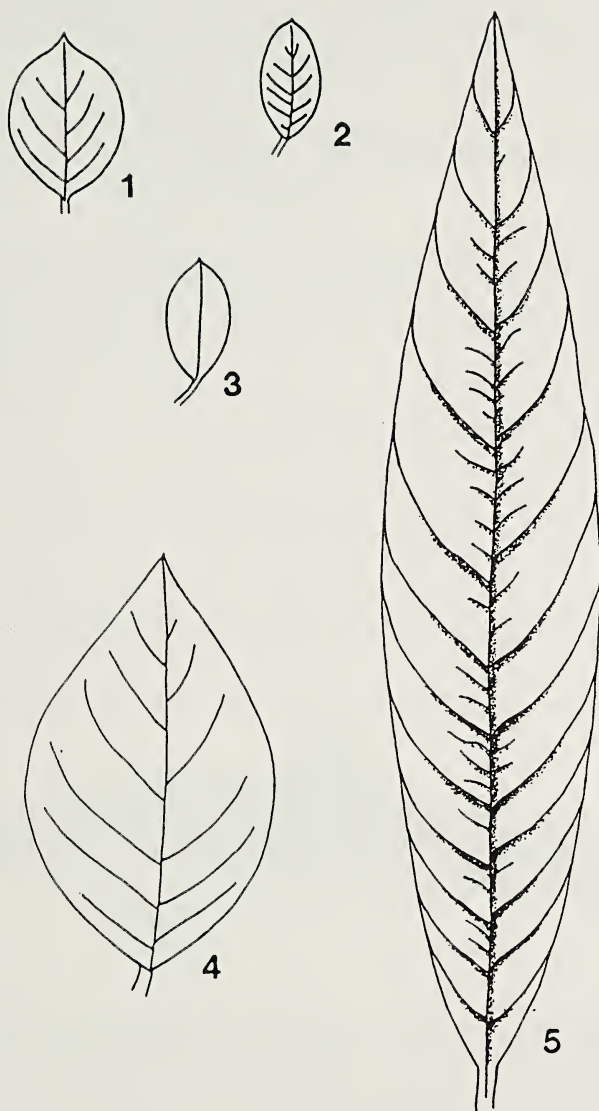
Since our previous report we have been appraised of four other records from V.C.77. In addition there are four V.C.76 records, the first from Kingspark in 1985 (L. Smith). Other records are from Bearsden (V.C.86) in 1987 and in the same year at the Goodyear Tyre site (V.C.99) (both J. H. Dickson)

C. salicifolius

The plant has now been recorded by us from waste ground at the Garden Festival site and at the edge of waste ground at Cessnock. It has also been seen at Clyde Place Quay. A *Cotoneaster* from Eastwood Cemetery (V.C.76) from 1987 and one from Drumchapel (V.C.99) in 1987 have now been identified as this species. (Last three J. H. Dickson). In 1992 we noted seedlings in Linn Park (V.C.76). Plants identified as this species but with bullate leaves (Fig. 5) are to be seen in Glasgow gardens and as a feature of landscape planting (e.g. Kelvinhaugh—K. J. Watson). So far we have not found one in a wild habitat.

C. simonsii

In addition to the fourteen 1km squares previously reported, we have seen this plant in a further two and it has been reported from an additional six sites



Figs. 1-5, leaves of *Cotoneaster* species X 1.3. (1) *C. apiculatus*; (2) *C. conspicuus*; (3) *C. integrifolius*; (4) *C. sternianus*; (5) *C. salicifolius*—bullate form.

during recording for the *Flora of Glasgow*. These include Drumchapel (V.C.99) in 1987 (J. H. Dickson) and from Crookston (1986), Newlands and Crossmyloof (all V.C.76).

C. x suecicus

In the autumn of 1991 a seedling was seen on bare gravelly ground in Cessnock. It increased in size during 1992 but has not yet flowered.

Loss

C. cashmiriensis

Subsequent to writing the previous article it was decided to visit representative sites to obtain photographs of all the species of *Cotoneaster* in the area. When we went to the cut-off section of Hospital Street to make a photographic record of *C. cashmiriensis* there were policemen at every street corner and every piece of adjacent waste ground had been cleared leaving only bare earth. Unfortunately this clearance included the area under the rail where this plant had grown. On enquiry we learned that the surrounding area had been tidied up in preparation for a visit that day by the Princess Royal to the nearby Sheriff Court Buildings.

C. frigidus x *C. salicifolius*

The Bellahouston and Hyndland plants have been destroyed but there are still four known extant sites in the area.

C. x suecicus

The plant recorded from the Garden Festival site was not present in 1992. However as indicated above a seedling is present on waste ground at Cessnock.

Other species of *Cotoneaster* have been noted in local nurseries, gardens and landscape planting so it is likely that the range of species in the wild will increase yet further.

Acknowledgments

We are very grateful to Mrs J. Fryer and Mr J. R. Palmer for identifications and helpful comments.

Reference

- MACPHERSON, P. and LINDSAY, E. L. S., 1992. *Cotoneasters* in the Glasgow section of V.C.77. *Glasg. Nat.* 22: 111-114.

First Records of the Striped Dolphin, *Stenella coeruleoalba*, in Scottish Waters

R. J. REID^a, A. KITCHENER^b, H. M. ROSS^a,
and J. HERMAN^b

^aSAC Veterinary Services, Drummondhill,
Stratherrick Road, Inverness IV2 4JZ.

^bDepartment of Natural History, Royal Museum of
Scotland, Chambers Street, Edinburgh EH1 1JF.

The striped or euphrosyne dolphin, *Stenella coeruleoalba* (Meyen), Fig. 1 has a world-wide distribution in tropical and warm temperate waters (Evans, 1991). In Britain it is regarded as rare, normally being stranded in the south-west of England and, in recent years, in Wales (Sheldrick, 1989; Evans, 1991). There was also a stranding on the Suffolk coast in 1991 (S. Phillips, pers. comm.). However, since strandings records began in Britain in 1913, no striped dolphins have been recorded as far north as Scotland.



Fig. 1 The Striped Dolphin. This species can be distinguished from the Common Dolphin by its possession of a dark stripe which runs along its side from behind the eye to just before the tail. (Fig. 1 is reproduced, with the permission of Blackwell Scientific Publications from *The Handbook of British Mammals*, Ed. 2. 1977, by G. B. Corbet and H. N. Southern.).

On 4 August 1988 a striped dolphin was stranded at Braenish, Isle of Lewis. Unfortunately, this specimen was not collected, but photographs taken at the time of its discovery which are now held in the strandings archive at the Royal Museum of Scotland confirm its identity. On 18 November 1988 another striped dolphin was stranded at Kerrera in Argyll. A third striped dolphin was stranded alive on 8 September 1991 at Glenelg, but it died soon after.

As part of Britain's commitment to the North Sea Conference, the Department of the Environment has undertaken to finance research into the causes of strandings of cetaceans and seals in Scotland. Since the Scottish Strandings Scheme began on 1 January 1992, the Scottish Strandings Coordinator (R. J. Reid) has confirmed that a further five striped dolphins have been stranded in Scotland (Table 1). The North Uist animal was stranded alive and the remainder were stranded as freshly dead animals. It seems therefore, most likely that these striped dolphins were present in Scottish waters and had not drifted there as dead animals on ocean currents from warmer waters.

Of particular interest is the stranding of a striped dolphin on the east coast at Findhorn (Table 1). The only other stranding of a striped dolphin on the east coast of Britain was in Suffolk on 6 February 1991. It is not known whether this animal had travelled around the north of Scotland from the west, or had moved into the North Sea via the English Channel.

The question remains as to why the striped dolphin should have arrived so recently in Scottish waters and in apparently increasing numbers. In part the greater incidence of striped dolphin strandings is possibly due to an increased number of all cetacean strandings reports in Britain and Ireland in recent years (Bruton and Greer, 1985; Sheldrick, 1989; see also Cetacean Notes in the *Irish Naturalists' Journal* 1986-87, 1989-91). Also it is possible that in the past striped dolphins have been confused with common dolphins, *Delphinus delphis* (Linnaeus) since there was no expectation of the former in Scotland. This is known to have occurred in Ireland where skulls from earlier strandings of common dolphins have been recently reidentified as striped dolphins (O'Riordan and Bruton, 1986). There may also have been a northward expansion of range of this species. Evans (1991) reports that there are a few records of striped dolphins 700km to the west of Scotland.

Skulls and, where appropriate, complete skeletons of marine mammals examined under the strandings scheme are donated to The National

Table 1. Records of Striped Dolphins stranded on the Scottish coast in 1992.

Ref. No.	Sex	Date	Location	Grid Ref.	Length (cm)
M0696/92	M	3.4.92	FINDHORN	NJ041650	211.5
M1775/92	M	8.8.92	ISLAY	NR272623	205
M1908/92	M	23.8.92	NORTH UIST	NF723663	182
M1969/92	M	28.8.92	ISLAY	NR206636	180
M2004/92	M	29.8.92	SKYE	NG378321	185

Museums of Scotland. The skull from the Glenelg dolphin, all the skulls from the dolphins in Table 1, and also the complete skeleton from the North Uist dolphin are held there.

Acknowledgments

The coordinator of the Scottish Strandings Scheme would like to thank all members of the public, volunteer groups and official bodies who have reported strandings.

The Scottish Strandings Scheme is operated under contract to the UK Department of the Environment as a contribution to its co-ordinated programme of research on the North Sea.

SAC receives financial support from the Scottish Office Agriculture and Fisheries Department.

References

- BRUTON, T. and GREER, J. (1985). Euphrosyne dolphin *Stenella coeruleoalba* (Meyen). *Ir. Nat. J.* 21: 538-540.
- EVANS, P. G. H. (1991). Whales, dolphins, and porpoises: Order Cetacea. *In*: Corbet, G. B. and Harris, S. (eds.). *The Handbook of British mammals*. 3rd edition. pp.299-350. Oxford: Blackwell Scientific.
- O'RIORDAN, C. E. and BRUTON, T. (1986). Notes on the crania of the Euphrosyne Dolphin *Stenella coeruleoalba* (Meyen) in the collection of the National Museum of Ireland. *Ir. Nat. J.* 22: 162-163.
- SHELDRIK, M. C. (1989). Stranded whale records for the entire British coastline, 1967-1986. *Investigations on Cetacea*, 22: 298-329.

Book Reviews

The Soil

B. DAVIS, N. WALKER, D. BALL and A. FITTER

Harper Collins, *The New Naturalist*, 1992, 192 pages, colour and monochrome photographs, drawings, graphs, maps. Limpback, ISBN 0 00219 904 1, £12.99.

This book may be regarded as a successor to the late Sir John Russell's earlier volume in this series *The World of The Soil*, but, written by four well-known specialists in soil science, it is much more than a mere up-date of the earlier work.

The first two chapters deal respectively with the architecture of the soil and the variety of soils in Britain, and the next four with the living inhabitants of the soil—plants, animals and micro-organisms. The associations between plants' roots and mycorrhizal fungi are considered in detail.

The final chapters deal with natural habitats, agricultural soils, soil reclamation and restoration.

The text is clear, informative and well-written. Typographical errors are few: certain of the monochrome photographs, e.g. that on p. 40 would have been better in colour. A serious criticism is the paucity of references: how much more useful the book could have been if sources had been cited more liberally.

RONALD M. DOBSON

Flitting the Flakes

M. PEARSON (Ed.) Aberdeen University Press and National Museums of Scotland, Edinburgh, 1992, 352 pages, ISBN 1 85752 008 4, £25.00.

At first sight not a title which has any implications for natural history, but much relevant information is to be found in the pages of this book. This is a diary kept between 1789 and 1797 by a Stonehaven farmer, James Badenach. In addition to his meticulous daily weather records the seasonal work of farm and garden is documented, and herein lies a wealth of information for anyone interested in 18th century agriculture and horticulture—the plantings, cultivation (including pests—especially caterpillars), the harvests, and other observations on the changing countryside.

Flitting the Flakes? This refers to the regular chore of moving the hurdles or temporary fencing.

A. D. BONEY

Records of Lepidoptera on North Uist, Outer Hebrides

K. P. BLAND

35 Charterhall Road, Edinburgh EH9 3HS.

The non-marine invertebrates occurring in the Outer Hebrides (V.C.110) were painstakingly catalogued by Waterston (1981) in the hope of stimulating recording in this interesting area. However disappointingly few records have been added in the intervening decade. Thus a short stay on North Uist from 11-18 July 1992 resulted in a number of additions being made to the list of Lepidoptera recorded from these islands as well as from North Uist in particular. Most collecting and recording was done in the northern part of the island. For completeness the list includes all of the Microlepidoptera which were recorded.

Species recorded

In the following list specific names and reference numbers are as in Bradley and Fletcher (1979). Ordnance Survey National Grid references are given in brackets after the place names. The following symbols are used:

** indicates new to the Outer Hebrides

* indicates new to N. Uist.

+ indicates apparently not recorded since last century.

HEPIALIDAE

14. *Hepialus humuli* (Linn.). One female to light at Malaclete (NF7973) 11/12.vii.

18. *H. fusconebulosa* (DeG.). One female to light at Middlequarter (NF8074) 15/16.vii.

NEPTICULIDAE

66. **Stigmella sorbi* (Stt.). Vacated mines in *Sorbus aucuparia* in Eaval & Burrival area (NF9060, 9062 & 9161) on 15.vii.

68. ***S. salicis* Stt. Single vacated mine in *Salix aurita* at Alioter (NF8873) on 18.vii.

TINEIDAE

227. +*Monopis laevigella* (D. & S.) (= *M. rusticella* Hb.). One beaten from *Calluna vulgaris* at Alioter (NF8873) on 17.vii.

228. ***M. weaverella* (Scott). One to light at Malaclete (NF7973) on 11/12.vii.

GRACILLARIIDAE

294. +*Aspilapteryx tringipennella* (Zell.). One old and 2 early mines in *Plantago lanceolata* at Oban Trumisgarry (NF8774) on 18.vii.

CHOREUTIDAE

385. *Anthophila fabriciana* (Linn.). Larvae on *Urtica dioica* at Malaclete (NF7973) on 12.vii; one imago in flight at Dùn an Sticir (NF8977) on 18.vii.

GLYPHIPTERIGIDAE

392. **Glyphipterix schoenicolella* Boyd. Reared from larvae in seedheads of *Schoenus nigra* from Alioter (NF8873) on 13.vii.

397. +*G. thrasonella* (Scop.). One small imago swept at Alioter (NF8873) on 14.vii.

YPONOMEUTIDAE

464. +*Plutella xylostella* (Linn.). 2 to light at Malaclete (NF7973) on 11/12.vii; 1 flying at Alioter (NF8873) on 14.vii; 3 to light at Middlequarter (NF8074) on 15/16.vii.

COLEOPHORIDAE

583. ***Coleophora tamesis* Waters. A few by day at Malaclete (NF7973) on 11.vii; 1 to light at Malaclete on 11/12.vii. Genitalia checked.

ELACHISTIDAE

626. ***Biselachista serricornis* (Stt.). One female by day at Loch Ialaidh (NF8970) on 17.vii.

628. ***B. eleochariella* (Stt.). One female in flight in evening at Malaclete (NF7973) on 11.vii; one in flight at dusk at Alioter (NF8873) on 14.vii.

630. **B. albidella* (Nyl.). One by day at Langass Burial Cairn (NF8365) on 16.vii.

OECOPHORIDAE

647. +*Hofmannophila pseudospretella* (Stt.). One dead in cottage at Balranard NR (NF7070) on 14.vii.

654. ***Pleurota bicostella* (Clerck). One disturbed on moorland near Langass Burial Cairn (NF8365) on 16.vii.

688. **Agonopterix heracliana* (Linn.). Reared from larvae on *Heracleum sphondylium* from Alioter (NF8872) on 13.vii; one dead in cottage at Balranard NR (NF7070) on 14.vii.

GELECHIIDAE

768. **Teleiodes notatella* (Hubn.). Larvae numerous on *Salix aurita* leaves at Alioter (NF8873) on 18.vii.

811. **Scrobipalpa samadensis plantaginella* (Stt.). One to light at Malaclete (NF7973) on 11/12.vii; one disturbed at Garry Gaal (NF7072) on 16.vii.

820. ***S. artemisiella* (Treits). Several disturbed from *Thymus drucei* at Newtonferry (NF8978) on 18.vii.

822. ***S. acuminatella* (Sirc.). One in grass at Garry Gaal (NF7072) on 16.vii. Genitalia checked.

829. **Caryocolum marmoreum* (Haw.). One alive in cottage at Balranard NR (NF7070) on 14.vii.

COCHYLIDAE

954. **Eupoecilia angustana* (Hübner). Single specimens from Balranard NR (NF6970) on 14.vii; Alioter (NF8873) on 14.vii and Burrival (NF9062) on 15.vii.

TORTRICIDAE

988. **Aphelia viburnana* (D. & S.). One at Bealach Maari (NF8673) and 3 at Alioter (NF8873) on 14.vii; one near Langass Burial Cairn (NF8365) on 16.vii.

1029. *Eana osseana* (Scop.). Widespread but rarely common. Recorded from Balranard NR (NF7070), Malaclete (NF7973), Middlequarter (NF8074) and Sollas (NF8075).

1040. **Acleris caledoniana* (Steph.). Reared from larvae in spun shoots of *Calluna vulgaris* from near Crogary Mhór (NF8673) on 13.vii and from Loch Ialaidh (NF8970) on 17.vii; also reared from single larva in folded leaf of *Rubus Fruticosus* from Loch Ialaidh on 17.vii.

1048. **A. variegana* (D. & S.). Reared from larvae in spun leaves and berries of *Sorbus aucuparia* from Loch na Moracha (NF8466) on 16.vii.

1053. **A. hastiana* (Linn.). Reared from larvae in spun shoots of *Salix aurita* from Alioter (NF8872) on 13.vii.

1067. **Olethreutes cespitana* (Hübner). One to light at Middlequarter (NF8074) on 15/16.vii; one to light at Malaclete (NF7973) on 16/17.vii.

1076. **O. lacunana* (D. & S.). One only in Burrival area (NF9062) on 15.vii.

1109. **Lobesia littoralis* (H. & W.). Reared from larvae in seedheads of *Armeria maritima* from Garry Gaal (NF7072) on 16.vii.

1111. **Bactra lancealana* (Hübner). Widespread and common. Recorded from Balranard NR (NF6970); Garry Gaal (NF7072); Malaclete (NF7973); Langass Burial Cairn (NF8365); Bealach Maari (NF8673); Alioter (NF8873) and Burrival area (NF9062).

1197. **Eucosma campoliliana* (D. & S.). Eleven to light at Malaclete on 11/12.vii; several at Alioter (NF8873) on 14.vii; few on *Senecio jacobaea* flowers at Oban Trumisgarry (NF8774) on 18.vii.

1201. **E. cana* (Haw.). Two at Malaclete (NF7973) on *Cirsium vulgare* on 11.vii; 48 & one to light at Malaclete on 11/12.vii & 16/17.vii respectively; a few at Sollas (NF8074) on 12.vii; a few at Langass Burial Cairn (NF8365) on 16.vii.

1273. *Dichrorampha petiverella* (Linn.). Three on Balranard NR (NF6970, NF7070) on 14.vii. Genitalia checked.

1283. **D. montanana* (Dup.). A few at Alioter (NF8873) on 14.vii. Genitalia checked.

PYRALIDAE

1294. **Crambus pascuella* (Linn.). Several at dusk at Alioter (NF8873) on 14.vii; one by Loch Ialaidh (NF8970) on 17.vii.

1302. **C. perlella* (Scop.). Two to light at Malaclete (NF7973) on 11/12.vii.

1304. *Agriphila straminella* (D. & S.). Widespread and common. Recorded from Malaclete (NF7973), Garry Gaal (NF7072), Langass Burial Cairn (NF8365), Sollas (NF8175), Alioter (NF8872), Bealach Maari (NF8673), Middlequarter (NF8074), Loch Ialaidh (NF8970), Eaval (NF9060), Burrival (NF9062) & Lochmaddy Hospital (NF9169).

1314. **Catoptria margaritella* (D. & S.). Several at dusk at Alioter (NF8873) on 14.vii.

1334. +*Scoparia ambigualis* (Treits.). Many at Bealach Maari (NF8673) on 14.vii; one at dusk at Alioter (NF8873) on 14.vii; one at Langass Burial Cairn (NF8365) on 16.vii; many at Loch na Moracha (NF8466) on 16.vii.

1336. ***Eudonia pallida* (Curt.). One to light at Malaclete (NF7973) on 11/12.vii.

1345. *Nymphula nymphaeata* (Linn.). One at Aird an Runair (NF6970) on 14.vii; several cut-out cases on *Nymphaea alba* L. in Loch Ialaidh (NF8970) on 17.vii; one imago and 2 larval cases on *Potamogeton* sp. at Alioter (NF8873) on 17.vii.

In addition the following Macrolepidoptera are additional to Waterston's list for North Uist:

THYATIRIDAE

1655. **Tethea or* (D. & S.). Popular Lutestring. Early larvae between apposed leaves of *Populus tremula* in Eaval area (NF9061) on 15.vii.

GEOMETRIDAE

1742. **Campptogramma bilineata* (Linn.). Yellow Shell. One at Malaclete (NF7973) on 11.vii; one at Alioter (NF8872) on 13.vii; 3 in Burrival area (NF9062) on 15.vii.

1846. **Eupithecia nanata* (Hübner). Narrow-winged Pug. One swept from heather at Alioter (NF8873) on 14.vii.

1941. **Alcis repandata* (Linn.). Mottled Beauty. One on the wing in late afternoon on Bealach Maari (NF8673) on 14.vii; one in Eaval area (NF9061) on 15.vii.

NOCTUIDAE

2216. **Cucullia umbratica* (Linn.). The Shark. 2 to light at Malaclete (NF7973) on 17/18.vii.

2326. **Apamea crenata* (Hufner). Clouded-bordered Brindle. One to light at Malaclete (NF7973) on 11/12.vii.

2357. **Amphipoea lucens* Freyer. Large Ear. One reared from larva on *Calluna vulgaris* from Burrival area (NF9062) on 15.vii. Genitalia checked.

In conclusion the paucity of species recorded from the Outer Hebrides is apparently due more to under-recording than to the actual absence of species. The present results are the outcome of only one week's collecting and add 9 species new to Outer Hebrides, 29 species new to North Uist and 6 species confirming last century records. These 44 species represent more than half of the 78 species of Lepidoptera collected.

References

- WATERSTON, A. R., 1981. Present knowledge of the non-marine invertebrate fauna of the Outer Hebrides. *Proc. Roy. Soc. Edinb.* 79B, 215-321.
BRADLEY, J. D. and FLETCHER, D. S., 1979. *A Recorder's Log Book or Label List of British Butterflies and Moths*. Curwen Books, London.

Insect Records from the West of Scotland in 1991 and Some Records of Coleoptera for 1990

Compiled by E. G. HANCOCK

Art Gallery and Museum, Kelvingrove, Glasgow
G3 8AG.

In this list of records, specific names and reference numbers of Lepidoptera are as in Bradley, J. D. and Fletcher, D. S., 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*, Curwen Books, London. As entries are numbered family names have been omitted. Other insects are as in Kloet, G. S. and Hincks, W. D., 1964, (Small Orders and Hemiptera); 1976 (Diptera and Siphonaptera); 1977 (Coleoptera and Strepsiptera) and 1978 (Hymenoptera). Initials after each record are those of contributor (see page 254); NNR=National Nature Reserve, LNR=Local Nature Reserve.

HEMIPTERA-HETEROPTERA

TINGIDAE

Acalypta brunnea (Germar), Leacaneshie, Wester Ross, V.C.105, 11/3/91, SM.

A. carinata (Panzer), Inverpolly, Wester Ross, V.C.105, 8/8/91, SM.

A. nigrina (Fallen), Inverpolly, Wester Ross, V.C.105, 10/8/91, Loch a' Chaoruinn, Wester Ross, V.C.105, 10/8/91, SM.

SALDIDAE

Salda muelleri (Gmelin), Inverpolly, Wester Ross, V.C.105, 8/8/91, SM.

Saldula palustris (Douglas), Achnahaird Bay, Wester Ross, V.C.105, 10/8/91, SM.

Chartoscirta cincta (Herr.-Schaffer), Sheigra, West Sutherland, V.C.108, 9/8/91,

SH.

C. elegantula (Fallen), Southwick, Kirkcudbrightshire, V.C.73, 29/3/91, SH.

NEUROPTERA

SISYRIDAE

Sisyra fuscata (Fab.), Lochan Taynish, Argyll, V.C.101, 28/5/91, EGH.

LEPIDOPTERA

169. *Zygaena filipendulae* (Linn.), Ravenswood Marsh, Cumbernauld, V.C. 86 (no date), JG; Drumpellier Country Park, V.C.77, 28/7/91, RS; New Brock Burn, V.C.76, 12/8/91, KW; Newlands Road, Glasgow, V.C.77, in garden, 23/8/91, HW.

1545. *Colias croceus* Geoffroy (Clouded Yellow), Laigh Park, Paisley, V.C.76, 14/10/91, CB.

1553. *Anthocharis cardamines* (Linn.) (Orange Tip), New Galloway, V.C.73 (earliest record), 26/4/91, MNR; Pollok Country Park, Glasgow (latest record), 30/5/91, SE.

1555. *Callophrys rubi* (Linn.) (Green Hairstreak), Blackhill Mire, Helensburgh, V.C.99, 10/5/91; Blairbeich plantation, Dunbarton, V.C.99, 9/5/91, KF; Glencryan plantation, Cumbernauld, V.C.86, 'Springtime', JG.

1557. *Quercusia quercus* (Linn.) (Purple Hairstreak), Inverlanven Wood, V.C.99, 6/8/91, KF.

1590. *Vanessa atalanta* (Linn.) (Red Admiral), Pirnmill, Arran, V.C.100 (earliest record), 1/7/91, TR; Thornliebank, Glasgow, V.C.76 (latest record), 16/10/91, GH.

1591. *Cynthia cardui* (L.) (Painted Lady), Kilmelford, Argyll, V.C.98, 9/91, AMcGS & BHT; Ardnamurchan, V.C.97, 4/7/91, DB; Machrie, Arran, V.C.100, 21/7/91, TR; Ailsa Craig, V.C.75, 26-30/7/91, BZ; South Mealdarroch NNR, Argyll, V.C.101, 28/8/91, FRW; Carrick, V.C.73, 4/9/91; Balmacellellan, V.C.73, 12/9/91, MNR; Clints of Drumore, V.C.73, 30/9/91, JMcC; Leswalt, V.C.74, 9/9/91, JMcC; Upper Loch, Lochmaben, V.C.72, 20/9/91, LVF.

1597. *Inachis io* (Linn.) (Peacock), Barons Haugh, V.C.77, 5/91, RS; Taynish, V.C.101, large numbers, 20/9/91, JBH; Cadzow bog, V.C.77, 20/8/91, KW.

1610. *Euphydryas aurinia* Rott. (Marsh Fritillary), near Cairnbaan, V.C.101, 6/6/91; Taynish, V.C.101, 3-10/7/91; Moine Mhor, V.C.98, 6-19/7/91, JBH; Islay, V.C.102, several new colonies, not specified, Islay Natural History Trust.

1621. *Hipparchia semele* (L.) (The Grayling), Inverpolly, Wester Ross, V.C.105, 8/8/91, SH.

DIPTERA

TIPULIDAE

Tipula signata Staeger, North Mealdarroch NNR, Argyll, V.C.101, 9/9/91, EGH.

Limonia trivittata (Schummel), Ardmore Point, Dunbarton, V.C.99, 16/5/91, EGH.

Ormosia pseudosimilis (Lundstroem), Mugdock, Stirlingshire, V.C.86, 29/7/91, EGH.

ANISOPODIDAE

Mycetobia pallipes Meigen, North Mealdarroch NNR, Argyll, V.C.101, larvae in birch sap run, 13/8/91, EGH.

EMPIDIDAE

Empis digramma Meigen, Ardmore Point, Dunbarton, V.C.99, 16/5/91, EGH.

SYRPHIDAE

Ferdinanda cuprea (Scopoli), North Mealdarroch NNR, Argyll, V.C.101, 14/8/91, EGH.

Helophilus trivittatus (Fab.), near Balcarry Point, Kirkcudbrightshire, V.C.73, 2/9/91, SH.

COLEOPTERA

DYTISCIDAE

Hydroporus longicornis (Sharp), Cairn Hill LNR, Ayr., V.C.75, 26/6/90, MS.

Hydroporus longulus (Mulsant), Feoch Meadows LNR, V.C.75, 26/6/90, MS; Cairn Hill LNR, Ayr., V.C.75, 26/6/90, MS.

HYDROPHILIDAE

Helophorus strigifrons (Thomson), Macawston Farm, Ayrs., V.C.75, 26/6/90, MS; Feoch Meadows LNR, Ayrs., V.C.75, 26/4/90, MS; Auchalton Meadows LNR, Ayrs., V.C.75, 26/4/90, MS.

Cercyon ustulatus (Preyssler), Macawston Farm, Ayrs., V.C.75, 26/6/90, MS.

LEIODIDAE

Leiodes obesa (Schmidt), Cairn Hill LNR, Ayrs., V.C.75, 26/6/90, MS; Shewalton Sandpits LNR, Ayrs., V.C.75, 25/7/90, MS; Auchalton Meadows LNR, Ayrs., V.C.75, 25/7/90, MS.

Leiodes ovalis (Schm.), Shewalton Sandpits LNR, Ayrs., V.C.75, 26/6/90, MS.

Leiodes rufipennis (Payle), Shewalton Sandpits LNR, Ayrs., V.C.75, 28/8/90, MS.

Choleva glauca (Britten), Auchalton Meadows LNR, Ayrs., V.C.75, 27/5/90, MS.

SILPHIDAE

Nicrophorus interruptus Stephens, Cairn Hill LNR, Ayrs., V.C.75, 24/7/90, MS.

Aclypea opaca (L.), Cairn Hill LNR, Ayrs., V.C.75, 26/4/90, MS; Auchalton Meadows LNR, Ayrs., V.C.75, 24/7/90, MS.

STAPHYLINIDAE

Atheta (A.) *heymesii* Hubenthal, Auchalton Meadows LNR, Ayrs., V.C.75, 26/4/90, second British record, MS.

BYRRHIDAE

Byrrhus arietinus Steffahny, Shewalton Sandpits LNR, Ayrs., V.C.75, 26/4/90, MS.

CANTHARIDAE

Rhagonycha elongata (Fallen), Cairn Hill LNR, Ayrs., V.C.75, 26/6/90, MS.

Rhagonycha translucida (Krynicky), Feoch Meadows LNR, Ayrs., V.C.75, 24/7/90, MS; Auchalton Meadows LNR, Ayrs., V.C.75, 24/7/90, MS.

CHRYSOMELIDAE

Aphthona nigriceps (Redtenbacher), Shewalton Sandpits LNR, Ayrs., V.C.75, 9-10/90, det. M. L. Cox, MS.

Longitarsus brunneus (Duftschmid), Shewalton Sandpits LNR, Ayrs., V.C.75, 9-10/90, MS; Cairn Hill LNR, Ayrs., V.C.75, 9-10/90, MS; Auchalton Meadows LNR, Ayrs., V.C.75, 26/4/90, MS.

CURCULIONIDAE

Otiorynchus scaber (L.), Auchalton Meadows LNR, Ayrs., V.C.75, 28/8/90, MS.

Barynotus squamosus Germar, Auchalton Meadows LNR, Ayrs., V.C.75, 26/6/90, MS; Cairn Hill LNR, Ayrs., V.C.75, 24/7/90, MS.

Tropiphorus terricola (Newman), Auchalton Meadows LNR, Ayrs., V.C.75, 26/6/90, MS.

Grypus equiseti (Fabr.), Shewalton Sandpits LNR, Ayrs., V.C.75, 26/6/90, MS

HYMENOPTERA

CIMBICIDAE

Abia candens Konow, Carsaig Glen, Argyll, V.C.101, 29/5/91, EGH.

Contributors

Chris Balling (CB), David Barbour (DB), Steve Edwards (SE), L. V. Fleming (LVF), Keith Futter (KF), J. Gillespie (JG), J. B. Halliday (JBH), E. G. Hancock (EGH), Greer Hart (GH), Steve Hewitt (SH), J. McCleary (JMcC), Steve Moran (SM), M. N. Rankin (MNR), Tristan ap Rheinalt (TR), Alan Stirling (AMcGS), Magnus Sinclair (from material collected by G. N. Foster) (MS), Richard Sutcliffe (RS), B. H. Thompson (BHT), H. Walker (HW), Keith Watson (KW), Fred Woodward (FRW).

Book Review

The Trials of Life

DAVID ATTENBOROUGH

Reader's Digest Augmented and Enlarged Edition based on the original Collin's/BBC Edition, 1992, 365 pages, numerous colour photographs. Hardback, ISBN 0 276 42034 9, £24.95.

Sir David Attenborough is to be congratulated on completing his Animal Trilogy within ten years. Each of the three television series has been accompanied by a companion book, and this present work *The Trials of Life* has been expanded and augmented by Reader's Digest to form a magnificent and beautifully illustrated volume. The first part of the Trilogy, *Life on Earth* examines the diversity of animal life and traces the development of animal life from its beginnings. The second part, *The Living Planet* studies the way in which environment shapes the bodies of animals. This, the final part, *The Trials of Life* explores the way animals use their bodies and the way they behave.

It is difficult to understand why Attenborough chose this title for such a celebration of the extraordinary and complex behaviour patterns described and illustrated here, but he does state that all animal behaviour can be reduced to each species going through the trials of reproducing its own kind.

Attenborough is generous in acknowledging the information supplied to him by zoologists working in the field throughout the world, but manages to bring together the wealth of information in a text which is uniquely his own; his voice can be heard throughout.

JEAN M. MILLAR

The Natural History of the Muck Islands, North Ebudes

9. Insecta: Neuroptera, Trichoptera, Siphonaptera and Hymenoptera – Symphyta and Aculeata

RONALD M. DOBSON

Department of Zoology, University of Glasgow,
Glasgow G12 8QQ.

This paper records all the species of the above groups recorded during some 36 visits to the islands since work commenced in 1977.

Methods of collecting were numerous (Dobson, 1991). Most records for the present list were derived from sweep-netting, ultra-violet light trapping and pit-falls.

Species are listed with details of their habitats, distribution and abundance. Also, to facilitate comparisons, their occurrence in other islands within the Small Isles and Outer Hebrides as derived from the following sources is indicated.

Canna—Bertram (1939); Eigg—Kevan (1940); Rum—Wormell (1982), Hancock (1992); Outer Hebrides—Waterston (1981).

Species names follow the checklists of Kloet and Hincks (1964), Fitton *et al.* (1978), Richards (1958) and Morgan (1984).

Place names are as in Dobson and Dobson (1985) and Dobson (1987). M=Muck; L=Lamb Island; H=Horse Island; Ea=Eagamol; C=Canna; E=Eigg; R=Rum; OH=Outer Hebrides, V.C.110; 37, 38, 47, 48=10km National Grid square (NM). Identifications were based on the literature and, where possible, comparison of named specimens in the Hunterian Museum, Glasgow University. Species marked * were verified by dissection.

List of Species

NEUROPTERA

HEMEROBIIDAE

- Hemerobius micans* Olivier; M; 47; Central Wood; Rare (det. E.G. Hancock).
Wesmaelius betulinus (Strom, H.); M; 47; on Rowan, Central Wood; rare (det. E. G. Hancock); (R).

CHRYSOPIDAE

- Chrysopa carnea* Stephens; M; Blar Mor; marsh near Toaluinn; (OH).

TRICHOPTERA

PHILOPOTAMIDAE

- **Philopotamus montanus* (Donovan); M; 47; Camas Mor (C.R.OH).

POLYCENTROPIDAE

- **Plectrocnemia conspersa* (Curtis); M; 47, 48; in swamp near sheep fank, S. of Gallanach; Port Mor; Gallanach; abundant and widespread; (C.R., OH).
 **Holocentropus dubius* Rambur; M; 48; adults and larvae at Am Maol Lochan; common; (E.R.)

LIMNEPHILIDAE

- **Limnephilus affinis* Curtis; M; 48; Gallanach; (C.R.OH).
 **Limnephilus auricula* Curtis; M; 47, 48; abundant and widely distributed; (R.OH).
 **Limnephilus ignavus* McLachlan; N; 48; near Camas na Cairidh 1 spec.; (R).
 **Limnephilus lunatus* Curtis; M; 47, 48; in bog near north coast; Central Wood; Port Mor; common and widespread; (R.OH).
 **Limnephilus luridus* Curtis; M; 48; near Camas na Cairidh 1 spec.; (C.R.OH).
 **Limnephilus marmoratus* Curtis; M; 47, 48; abundant and widely distributed; (E.R.OH).
 **Limnephilus sparsus* Curtis; M; 47, 48; frequent and widely distributed; (C.R.OH).
 **Anabolia brevipennis* (Curtis); M; 47; Port Mor; few.
 **Pomatophylax latipennis* (Curtis); N; 48; Gallanach; (R).
 **Halesus radiatus* (Curtis); M; 48; in swamp near Camas na Cairidh; (C.R.OH).
Stenophylax lateralis (Stephens); M; 47, 48; Square Wood; Gallanach; Central Wood; Port Mor; common and widely distributed; (R).
 **Stenophylax sequax* (McLachlan); M; 47; Port Mor, several; (R.OH).

SIPHONAPTERA

CERATOPHYLLIDAE

- Nosopsyllus fasciatus* (Bosc); M; on Brown Rat, *Rattus norvegicus* (Erxleben), Port Mor; (R.OH).
Megabothris rectangularis (Wahlgren); M; 47; in pitfall trap; (a parasite of voles including Short-tailed Vole, *Microtus agrestis* (Linnaeus) — Smit, 1957).
Dasypsyllus gallinulae gallinulae (Dale, C.W.); M; in Tullgren funnel extraction of moss; (parasitic on numerous species of birds — Smit, 1957); (R.OH).

LEPTOPSYLLIDAE

- Palaeopsylla sorecis sorecis* (Dale, C.W.); M; on Pygmy Shrew, *Sorex minutus* Linnaeus, near Port Mor.

HYSTRICHOPSYLLIDAE

Typhloceras poppei Wagner; M; Port Mor Wood and Central Wood; (a parasite of the Wood Mouse, *Apodemus sylvaticus* (Linnaeus)—Smit, 1957); (OH).

Hystrichopsylla talpa talpa (Curtis); M; 47; in pitfall trap, mid-Muck; (parasitic on several species of small mammals—Smit, 1957); (E).

HYMENOPTERA

SYMPHYTA

TENTHREDINIDAE

**Loderus vestigialis* (Klug); M; 47; Central Wood.

**Dolerus aeneus* Hartig; M; 47, 48; Central Wood; Dun Ban; Gallanach; (R,OH).

**Dolerus asper* Zaddach; M; 47; in swamp, S. Muck.

**Athalia cordata* Lepeletier; M; 37, 47; swamp near sheep fank, S. of Gallanach; Central Lochan E.; Ben Airean; (C).

Tenthredopsis nassata (Linnaeus); M; 48; N. Muck; (C,R,OH).

Tenthredo acerrima Benson; M; 47; Port Mor and Central Wood; common; (OH).

Tenthredo schaefferi Klug; M; 48; N. Muck; common; (OH).

Pachyprotasis rapae (L.); Ea; 38; single specimen.

**Pristiphora coniceps* Lindquist; M; 48; NW Muck.

**Nematus mysotidis* (Fabricius); M; 47; near Gallanach.

Nematus ribesii (Scopoli); M; 47; larvae devastating gooseberry bushes at Port Mor; (C,R, OH).

**Pachynematus apicalis* (Hartig); M; 47; at Camas Mor; (OH).

APOCRITA—ACULEATA

CHRYSIDIDAE

Chrysis rutiliventris Abeille de Perrin; M; 37, 47; north end of Gleann Mhartein and near Central Wood; (R,OH).

FORMICIDAE

Myrmica lobicornis Nylander; M.

Myrmica ruginodis Nylander; M,L,H; 37, 38; common and widely distributed; (C,E,R,OH).

Myrmica sabuleti Meinert; M; 37, 47; Port an't Seilich; W. Coast; (C).

Myrmica scabrinodis Nylander; M; 48; on machair at Bagh; (E,R,OH).

Myrmica sulcinodis Nylander; M; (R).

Lasius flavus (Fabricius); M,H; widespread and common; (C,E,R).

EUMENIDAE

Ancistrocerus oviventris hibernicus Bluethgen; M; 47; Port Mor; West Muck; common; (C,R,OH).

Ancistrocerus scoticus (Curtis); M; (R,OH).

VESPIDAE

Vespula rufa (Linnaeus); M; 47, 48; Port Mor, Gallanach & North Muck; common; (R,OH).

SPHECIDAE

Mellinus arvensis (Linnaeus); M; 48; Gallanach Beach; (R).

APIDAE

**Bombus hortorum* (Linnaeus); M; 47; Central Wood; Gallanach; (C,OH).

Bombus jonellus (Kirby); M; in pitfalls at Am Maol; (C,R,OH).

Bombus lucorum magnus Vogt; M; 48; Gallanach, common; (C,R,OH).

**Bombus muscorum liepeterseni* Loken; M; 47; Gallanach; East Coast; Toaluinn; common; (C.R.OH).
Apis mellifera Linnaeus; M; 47; at Camas Mor.

Acknowledgments

I am grateful to Mr and Mrs Lawrence MacEwen for their hospitality on Muck and to my wife, Ruth, for her support and encouragement. Mr E. G. Hancock kindly identified the species of *Hemerobius* and *Wesmaelius* recorded.

References

- BERTRAM, D. S. (1939) The Natural History of Canna and Sanday, Inner Hebrides: A Report upon the Glasgow University Canna Expedition, 1936 and 1937. *Proc. R. phys. Soc. Ed.* 23: 1-72.
- DOBSON, R. H. & DOBSON, R. M. (1985) The Natural History of the Muck Islands, North Ebudes 1. Introduction and Vegetation with a list of Vascular Plants. *Glasg. Nat.* 21: 13-38.
- DOBSON, R. M. (1987) The Natural History of the Muck Islands, North Ebudes 4. Beetles. *Glasg. Nat.* 21: 335-349.
- DOBSON, R. M. (1991) The Natural History of the Muck Islands, North Ebudes 7. Insecta: Apterygota and Exopterygota. *Glasg. Nat.* 22: 31-40.
- FITTON, M.G., GRAHAM, M.W.R. de V., BOUCEK, Z.R.J., FERGUSON, N. D. M., HUDDLESTON, T., QUINLAN, J. & RICHARDS, O. W. (1978) Kloet and Hincks, a Check List of British Insects. Ed. 2 (Completely revised). *Handbooks for the identification of British Insects* XI, pt. 4. Royal Entomological Society of London.
- HANCOCK, E. G. (comp.) (1992) Some Records of Terrestrial Invertebrates from Rum National Nature Reserve 1990. *Glasg. Nat.* 22: 169-189.
- KEVAN, D. K. McE. (1940) The Insect Fauna of the Isle of Eigg. *Entomologist* 73: 247-254.
- KLOET, G. S. and HINCKES, W. D. (1964) *A Check List of British Insects*. Ed. 2 (Revised) Part 1: Small Orders and Hemiptera. Royal Entomological Society of London.
- MORGAN, D. (1984) Cuckoo-wasps, Hymenoptera, Chrysidae. *Handbook for the identification of British Insects*. Vol. VI, Pt. 5. Royal Entomological Society of London.
- RICHARDS, O. W. (1980) Scolioidea, Vespoidea and Sphecoidea: Hymenoptera, Aculeata. *Handbooks for the identification of British Insects*, Vol. VI. Pt. 3(b). Royal Entomological Society of London.
- SMIT, F. G. A. M. (1957) Siphonaptera. *Handbook for the identification of British Insects*, Vol. I, Pt. 16. Royal Entomological Society of London.
- WORMELL, P. (ed.) (1982) The Entomology of the Isle of Rhum National Nature Reserve. *Biol. J. Linn. Soc.* 18: 291-401.

David Ure (1749-1798) 'Breadth of Mind and Accuracy of Observation'

J. H. BURNS

Department of History, University College, London.

Outside the south door of St. Nicholas Kirk, Strathbrock (the parish church of Uphall), stands a weather-beaten slab bearing a Latin inscription. In translation it reads

D. Ure

Minister of Religion in this Church, after protracted suffering
from severe dropsy at last expired and gave his soul back to God
on the twenty-eighth day of March, A.D. 1798, and was buried here.

This monument

David Steuart, Earl of Buchan, in witness of his friendship,
caused to be erected.

We are dust and ashes

David Ure had been minister of Uphall for less than two years. Neither his brief ministry nor even the fact of his having been the friend of the remarkable, if eccentric, eleventh Earl of Buchan and buried in the Erskine family vault, would have earned him his brief entry in the *Dictionary of National Biography* or any claim to consideration in these pages. That recognition and that claim rest on a book published two centuries ago this year: *The History of Rutherglen and East-Kilbride, published with a view to promote the study of antiquity and natural history*, By David Ure, A.M., Preacher of the Gospel, Corresp. Memb. of the Nat. Hist. Soc. Ed. (Glasgow, 1793). By no means negligible as a contribution to local history in the antiquarian sense, the major significance of the book is reflected in the fact that its author made a point, on the title-page, of highlighting his connection with the Edinburgh Natural History Society. Natural history may occupy only two out of six chapters and just over a hundred out of 334 pages; but in assessing the book's importance for the subjects it sought to promote, these proportions would have to be more than reversed. Whether David Ure is justly called 'the father of Scottish palaeontology' is not a question

for a layman like the present writer to answer; but what follows may at least indicate something of the basis of that description and something of the man to whom it has been applied.

David Ure was born in Glasgow (baptized on 30 March 1749), the eldest of the nine children of Patrick Ure, a weaver, and his wife Isabell Malcolm. He followed his father in the weaving trade, but his talents and ambitions lay elsewhere. Having 'rapidly acquired a competent stock of classical learning at the grammar school' (Headrick 1808 in Gray 1865, 18), he matriculated at Glasgow University in 1770. His M.A. course lasted six years, during which he seems to have maintained himself as a weaver: 'He generally laboured the greatest part of the night; and while his hands were throwing the shuttle, his eye would be intent on Virgil, Homer or some (other) ancient author' (*ibid.*). He was particularly well regarded by James Moor, the professor of Greek, who would carefully exempt this 'mature student' from his strictures of an unruly and inattentive class composed largely of teen-age lads, bowing to him and saying,

'David Ure, he sits secure:
He'll ne'er be fined by Dr Moor'.

Already, however, Ure's interest in the natural sciences was manifesting itself—seemingly at first in such unpromising directions as the quest for perpetual motion or the philosopher's stone (*ibid.* 18-19); but already perhaps, as we shall see, engaging the interest of John Anderson, the vigorous and combative professor of natural philosophy. Looking, however, to his career prospects, Ure turned from arts to divinity, in order to qualify himself for the ministry of the Church of Scotland. He still had to maintain himself, but could now do so not as a weaver but as a school teacher. He became assistant in the parish school of Stewarton and later taught in 'a subscription school near Dumbarton' (*ibid.*, 19).

Something is known of David Ure's friends and associates during these student days. He is said to have 'belonged to a small coterie of political reformers' (Gray 1865, 22); and it seems clear that its central figure was John Anderson—'Jolly Jack Phosphorus' of the chair of natural philosophy. Significantly, Ure later gave Anderson from his collection one of two groups of mounted and framed microfossils which is now in the Art Gallery and Museum, Kelvingrove, Glasgow, Reg. No. G1986-9 (Plate 1). Even more significant is an item in the extraordinary will made by Anderson in May 1795, in which he laid down elaborate arrangements for what became the Andersonian

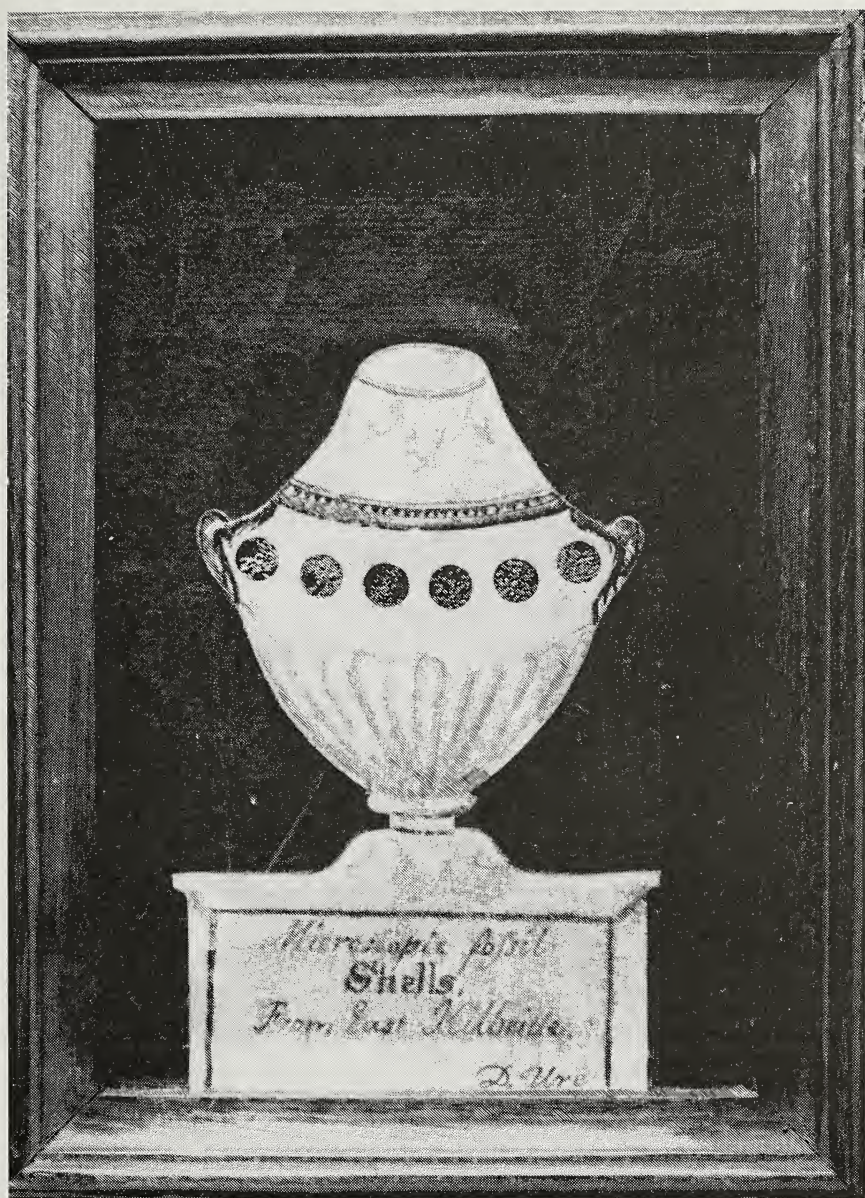


Plate 1. David Ure's plaque with microfossils at the Art Gallery and Museum, Kelvingrove, Glasgow. (Photograph supplied by Kelvingrove authorities.)

University. In his list of suggested occupants of professional chairs we find 'Mr David Ure, Preacher of the Gospel to be Professor of Natural History' (Mair 1950, 140). By then, of course, Anderson had before him the evidence of Ure's *History* (he is listed there as having subscribed for two copies). But we may reasonably suppose that his regard for his nominee had begun during the latter's student days, when Anderson's class must surely have been one that Ure found particularly interesting. A further reasonable surmise is that Ure would have been in broad sympathy with Anderson's educational aims, especially in regard to the artisan class from which he himself came.

Having completed his divinity studies and undergone the necessary 'trials', David Ure was licensed as a preacher by the presbytery of Glasgow on 11 June 1783, in his thirty-fifth year (Scott 1915-28, 1:234). For the next twelve years and more, it must be borne in mind, he was to be a 'stickit minister'. Preferment of a kind did, it is true, come his way fairly soon, when he became assistant minister at East Kilbride. His stipend was no more than ten pounds a year; but, in the light of what is now known of his family history, we may discount the suggestion that 'with this slender pittance he continued to relieve, if not wholly to support, his aged mother' (Headrick 1808 in Gray 1865, 19). We know little with certainty about the half-dozen years or more that Ure spent in East Kilbride. The minister, David Connell, was nearly eighty when his assistant was appointed; and it is reasonable to suppose that '(T)he whole of the pastoral work devolved on Ure'. He is said, presumably on the basis of local tradition, to have preached 'with simplicity, earnestness and authority, disclaiming all elegance of speech'. On one occasion, allegedly, Connell and Ure were jointly called upon 'to lay a ghost which was said to be stalking the village nightly' (Niven 1965, 126-7). It does appear that Ure ministered with success and acceptance in the parish, where his future prospects may well have seemed hopeful. David Connell died in the summer of 1790, and there seems to have been a general expectation that David Ure would succeed him as minister. However, Ure had not been 'ordained as assistant and successor', and three months after Connell's death, royal presentation to East Kilbride was secured for James French (1761-1835), then minister of the neighbouring parish of Carmunnock. French was not formally 'translated' until 24 April 1791, but by then David Ure had left the parish. Whether 'petticoat intrigues' or 'his political proclivities at a time when much keen feeling in this respect naturally existed' occasioned his disappointment (Headrick 1808 in Gray 1865, 19; Gray 1865, 22), the result was the same. In Ure's own words, 'My connection with that

parish being at an end, I went to England' (Ure 1793,v).

In another sense, and a more important one for present purposes, the connection with East Kilbride was by no means 'at an end'. During his years in the parish David Ure had developed and applied his talents as an observer and collector, assembling the materials for his history—in due course extended to cover Rutherglen as well—and no doubt writing early drafts of what became the substantial book published in 1793. Those years saw the beginnings of the collection which is now in the Hunterian Museum in Glasgow—first displayed (we are told) in a room in Brousterland, East Kilbride, the use of which was allowed by David Connell. The old minister was sufficiently interested in his young assistant's scientific activities to show visitors over this museum in miniature. An old man in the parish, who had worked as a boy on the parish glebe, would describe how he used to see Ure returning home, laden with specimens after a day's collecting (Niven 1965, 126). And no doubt we can refer to this as to later periods in Ure's life the following vivid description of his field-work equipment:

'a tin box for stowing curious plants—a large cudgel, armed with steel, so as to serve both as a spade and pick-axe; a few small chisels and other tools; a blow-pipe, with its appurtenances; a small liquid chemical apparatus, optical instruments, &c., &c., so that his friends used to call him a walking-shop, or laboratory' (Headrick 1808 in Gray 1865, 20).

The reference in this list to 'curious plants' is an important reminder of the range of David Ure's interests. He earns his place in the history of science, to be sure, primarily in the field of geology, and specifically of palaeontology. Yet his botanical contributions (not only palaeobotanical) should not be forgotten. His lists of plants were incorporated by John Ross (1808-71) in the more comprehensive list of flowering plants, ferns, etc. which was printed by Ross's brother William (Ross 1883, 126). And, while Ure lived well before the days of scientific archaeology and prehistory, he was certainly one of those pioneering antiquarians to whom the later sciences must acknowledge a debt.

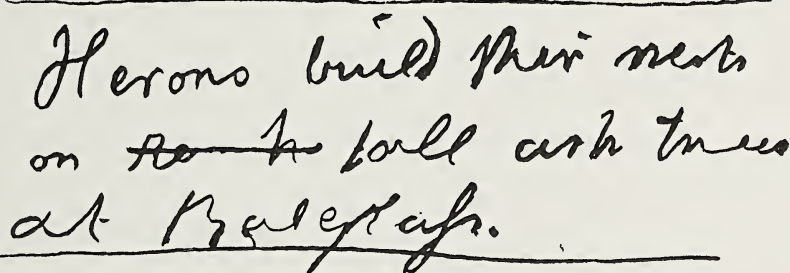
David Ure's work in natural history achieved some small degree of recognition well before the publication of his *History*. On 1 May 1788 he was elected as a corresponding member of the Natural History Society of Edinburgh (an honour duly recorded on the title-page of his book). The Society (to be distinguished from the later Wernerian Natural History Society) had been founded in 1782, with the Earl of Buchan as one of its original honorary members. It is tempting to suppose that

Ure's later aristocratic patron was responsible for proposing his name; but all we know is that the name (albeit mistakenly given as 'John Ure') is included in the list of members appended to the Society's laws when these were printed in 1803. Ure was certainly aware of Buchan's activities and interests. He tells us that the original impetus, in 1789, to write an account of East Kilbride had been 'the Rt. Hon. the Earl of Buchan's prospectus for a parochial history of Scotland'. This account, he adds, he 'intended to communicate to the Society of which the Earl was the founder'—that is, the Society of Antiquaries of Scotland (Ure 1793, iv).

This plan (with others, no doubt) was disrupted by David Ure's enforced departure from East Kilbride: he mentions that he was preparing his manuscript for publication when David Connell died (Ure 1793, v). His sojourn in England seems to have been brief: he had walked from East Kilbride to Newcastle, where, for a few months, he served as assistant minister to one of the Scottish Presbyterian congregations in the town. We do not know where he settled on his return to Scotland, though the balance of probability favours Glasgow. He must surely have been in that part of the country when (as seems likely) he was expanding what he had already written into the *History of Rutherglen and East-Kilbride* as we know it. In any case, he was, in the early 1790s, to find employment in which his talents as an observer and a recorder were to have new scope. The key figure here is Sir John Sinclair of Ulbster. Already, while David Ure was still at East Kilbride, Sinclair had initiated the major enterprise which, taking over and developing Buchan's scheme for a 'parochial history', was to produce the first *Statistical Account of Scotland*. The circular letter to parish ministers which launched the scheme would have reached East Kilbride only a few weeks before the old minister died; and it would always have been likely that the assistant would undertake to write the required account. In the event, despite his having left the parish, Ure did in fact write it, presenting in effect a drastically compressed version of what was to appear in full in the relevant part of his *History* (Ure 1793, v). This abridgement was published in 1792 in the third volume of the *Statistical Account*.

This, however, was no more than the beginning of Ure's involvement in the enterprise. He became—virtually for the rest of his life—a member of the 'secretarial and editorial staff' which Sinclair 'had the means to employ' (Mitchison 1962, 122). Not only did he provide—again 'abstracted' from his *History*—the account of Rutherglen in volume 9 (1793). He also wrote the substantial account of the parish of Killearn (vol. 16, 1796). One of the Ure manuscripts now in the

National Library of Scotland seems to be the travelling notebook he used when compiling material for that account (Fig. 1). It is clear too, though details are frustratingly few, that he performed various tasks for Sinclair 'at headquarters' in Edinburgh. He may well have 'superintended the publication of several of the last volumes' (Headrick 1808 in Gray 1865, 19). He certainly compiled the 'Alphabetical List of All the Parishes in Scotland with the Volume, Number and Page'—an essential means of making the publication 'user-friendly'—which appeared after his death in volume 20 (1798). Sinclair then took the occasion to acknowledge the services of 'the late worthy Mr David Ure, who, in various respects, contributed his assistance to this work' (Sinclair 1791-99, 20: 555).



Heron build their nests
on the tall ash trees
at Ballycragh.

Fig. 1 Tracing of an entry in one of David Ure's travelling notebooks (reduced by 10%).

All this, as we shall see, coincided and overlapped with work on another Sinclair enterprise. First, however, we need to say something about David Ure's enterprise in securing publication of his own major work. *The History of Rutherglen and East-Kilbride* was published by subscription. The list of subscribers fills twenty-two pages at the end of the volume, comprising over 700 names and accounting for over 900 copies—figures that surely reflect both the author's assiduity and the esteem with which he was regarded in various quarters. In particular, we can infer that he was well regarded in academic circles. Thirteen professors were among the subscribers, including some of the most notable figures of the day. Besides John Anderson, we find John Black (Chemistry, Edinburgh); John Millar (Law, Glasgow); Alexander Munro (Anatomy, Edinburgh); John Playfair (Mathematics, Edinburgh); John Robison (Natural Philosophy, Edinburgh); Dugald Stewart (Moral Philosophy, Edinburgh). One other Edinburgh figure should be added: though not a professor he was at least the equal in eminence of those who were—James Hutton, one of the leading geologists of his time.

Two figures whose names are not listed as subscribers are worth mentioning at this point. One is Lord Buchan; and it may be noted that David Ure presented a copy of the book to him (now in the possession of Mr William Niven, son of the modern historian of East Kilbride), inscribed 'To the Rt. Hon. the Earl of Buchan From the Author As a token of Gratitude & Esteem'. The other 'missing' name is that of John Hunter, F.R.S., the younger of the two celebrated brothers, natives of East Kilbride, who figured so prominently in the history of medicine and surgery in the eighteenth century. The elder brother, William, had died in 1783, just about the time when Ure went to East Kilbride as assistant minister. He is mentioned in glowing terms in Ure's history of the parish, with particular reference to Hunter's 'collection of antiquities and natural curiosities, (which) is not equalled, perhaps by any private museum in Europe' (Ure 1793, 176). Together with Hunter's books it was bequeathed to the University of Glasgow, where it formed the nucleus of the Hunterian Museum and Library. Of John Hunter, Ure says that he 'has arrived at the head of his profession in London' and 'is, by his medical investigations, &c. &c., daily adding honour to his name and place of nativity' (*ibid.*, 177). It was to John Hunter that Ure, seemingly while still in East Kilbride, presented a second set of mounted and framed microfossils. This was in the Hunterian Museum of the Royal College of Surgeons of England until the Second World War, though it has since been destroyed or lost.

1793 saw, besides the publication of David Ure's *History*, another event that was to be important for him. This was the establishment of the Board of Agriculture and Internal Improvement, with Sir John Sinclair (whose persistent advocacy of it had at last prevailed with the government) as President. Sinclair's 'fearsome energy' (Ferguson 1968, 171) produced a scheme for county-by-county agricultural surveys. Three of these were the work of David Ure:—Dunbarton (1794); Roxburgh (1794); and Kinross (1797). These are substantial pieces of work, incidentally revealing much that is of interest about Ure's outlook and cast of mind. One illustrative quotation must suffice here:

'On the proper education of youth, depends in a great measure the happiness of society, and the progress of every valuable pursuit. Ignorance in a community is the certain foundation of immorality, sloth and poverty. Improvements, therefore, in the arts and sciences, and in every thing valuable, can only be reasonably expected from persons whose minds, in the early periods of life, are opened by education' (Ure 1797, 38).

On the empirical side too there is ample evidence, not only of Ure's

competence as an observer, but of his strong belief in active enterprise. Thus he approved, retrospectively, of the attempt made, some twelve to fifteen years before the *Statistical Account* was launched, to introduce tobacco-growing in the Border counties. He suggests that, had it not been frustrated by legislation in 1783, 'the growth of tobacco, in this country, might have been brought to a high degree of perfection' (Ure 1794, 43). He believed also, however, in thoroughness and strict attention to detail: 'should not improvements in agriculture and husbandry be viewed as extending to every, even the most minute circumstances regarding the good of mankind?' (*ibid.*, 36). The keen observation and eye for detail which Ure brought to the discovery and illustration of natural phenomena had, in his view, their indispensable place in the amelioration of human society.

By the end of 1795 if not before, David Ure had settled (so far as the peripatetic nature of his work would allow) in Edinburgh, where he lived in Middleton's Entry off the Potterrow. Several letters from that address are preserved in the National Library among the papers of Robert Douglas, minister of Galashiels. Like Ure, Douglas had become involved both in the *Statistical Account* and in the Board of Agriculture scheme. He was now writing a *General View of the Agriculture of the Counties of Roxburgh and Selkirk* (published in 1798). Part of this superseded Ure's own account of Roxburghshire, but the response Douglas received to his enquiries was generous:

'I am very happy to hear that you have agreed to draw up the improved agricultural account of Roxburghshire. I am certain that from your immense knowledge of the country, and your good discernment the account will be more accurate than could be done by a stranger. . . . Any assistance in my power is at your service.'

Three further letters (the last dated 11 December 1795) show Ure giving Douglas precisely that kind of help.

In the same month (December 1795) patronage at last brought David Ure the preferment he had been denied since being licensed to preach in 1783. The Earl of Buchan, as principal heritor of the parish of Uphall, presented him to the charge; and after necessary but protracted preliminaries, Ure was ordained as minister there on 14 July 1796. What little is known of his twenty months' ministry need not concern us here. It is clear that his other activities continued, so far as circumstances allowed. The agricultural survey of Kinross (published in 1797) must have been completed during the Uphall period. And we know that his concern for the completion of the *Statistical Account* was still active within six or seven weeks of his death. Until what proved to be his

final illness overtook him in the autumn of 1797, we may reasonably assume that his investigations 'in the field' continued in what was to him new territory. Nor need it be too fanciful to surmise that John Fleming (of whom there will be more to say shortly), during his boyhood years near Bathgate, only a few miles from Ure's parish, saw the 'walking laboratory' in the flesh as well as responding eagerly (and this we know as a fact) to what he found in the *History of Rutherglen and East-Kilbride* (Primrose 1898, 62; Gray 1865, v-vi). For the last few months of his life, however, David Ure's horizons were increasingly limited to the church, the manse, and latterly his bed. Dropsy finally overcame him on 28 March 1798; three days later he was buried, thanks to his friend and patron Lord Buchan, in the Erskine vault of St. Nicholas Kirk.

A brief but not unappreciative obituary appeared in the *Gentleman's Magazine*, describing David Ure as 'a very intelligent man'. He left no will, and his 'testament dative and inventory' dated 16 April 1799, is concerned only with securing for his two surviving sisters and their husbands what was still owing of his ministerial stipend. His personal property, which must have consisted mainly of books and papers, together with his geological and other collections, was presumably disposed of by his relatives, doubtless in consultation with such interested parties as Buchan. Certainly the earl was in possession of some of Ure's papers: some of these were lent for a time to John Philip Wood (d. 1838), the remarkable deaf-and-dumb antiquary, who had, like Ure, assisted in the preparation of the *Statistical Account*. These may well be the manuscripts which found their way into the Advocates' Library and are hence now in the National Library of Scotland.

The significance of David Ure's work for natural history emerged gradually, though quite rapidly, in the decades following his death. In 1806 his friend (perhaps from their Glasgow student days) and colleague in Sinclair's atelier, James Headrick, wrote the biographical sketch which was published two years later in the *Scots Magazine* and which has been repeatedly cited here. The vicissitudes, not to say vagaries, of Headrick's own life deserve, and may receive elsewhere, treatment in their own right. Here what is to be observed is that Headrick, in such contexts as his substantial work on the island of Arran, was one of the first to draw attention to Ure's work:

'The late worthy Mr David Ure in his history of Kilbride and Rutherglen, and others, have brought to light many curious facts regarding the remains of animals and vegetables found in the secondary strata of the earth' (Headrick 1807, 302).

It is also worth noting that Headrick's book was dedicated to Sir Joseph Banks—that key figure in the history of science for half a century before his death in 1820—and that Banks was the owner of one of the three copies of Ure's *History* now in the British Library.

It was the palaeontological aspect of Ure's work, emphasized by Headrick, that was to command most attention. This point is significantly illustrated by the work of John Fleming (1785-1857), already mentioned briefly in the context of Ure's Uphall ministry. Fleming, an Edinburgh graduate, was Church of Scotland minister first on Bressay in Shetland and then, for many years, at Flisk in Fife. He pursued vigorously the scientific interests David Ure's example had helped to inspire. A member of the Edinburgh Natural History Society from 1805 and of the Wernerian Natural History Society from 1808, he had made ten communications to the latter as well as being elected a Fellow of the Royal Society of Edinburgh by the time his first substantial work was published in 1822. This was *The Philosophy of Zoology, or a General View of the Structure, Functions, and Classification of Animals*. It was followed six years later by *The History of British Animals*. Fleming acknowledged his indebtedness to Ure by using the term 'Urei' or 'Urii' to designate categories first recorded and illustrated in the *History of Rutherglen and East-Kilbride*. Already in 1815, moreover, he had manifested his admiration for the book by sending a copy to the English naturalist James Sowerby. In a letter of 3 March 1815, Sowerby wrote, 'It gives me much pleasure to receive by your favour the History of Rutherglen'. He adds, 'I think you might add much to Ure's History', and remarks that he had found it difficult to identify some of the species Ure had illustrated. That criticism was taken up when Sowerby's letter was quoted by John Duns in the memoir prefaced to Fleming's posthumous work on *The Lithology of Edinburgh*:

'This letter is interesting, both because of the reference to Ure's History of Rutherglen, and as indicating how little progress had been made in British palaeobotany at the time it was written. A glance now at the rough figures given by Ure, is sufficient to detect the species from which his discovery had been made. David Ure's book was a special favourite with Dr Fleming. He had early found in it a breadth of mind, and an accuracy of observation, in the young science, geology, which were not equalled in his native country at the time; and in his after labours, in more advanced science, he had great pleasure in referring to the work of the Scottish Church Probationer' (Fleming 1859, XVIII-XIX).

Fleming's 'after labours' took him first to the chair of natural philosophy at King's College, Aberdeen, and then, after the 1843

Disruption, to the chair of natural science at New College, Edinburgh. A good illustration of the kind of reference to Ure mentioned by Duns occurs in a communication to the Royal Society of Edinburgh on 5 February 1849:

'Dr Fleming called the attention of the Society to the extraordinary merits of Mr Ure, who died in 1798, leaving a memorial (in the *History of Rutherglen and East-Kilbride*) of an acquaintance with organic remains unequalled in the work of any contemporary author of the United Kingdom. This work, however, is very seldom referred to by modern palaeontologists, although extremely useful in illustrating the progress of discovery' (PRSE 2: 219).

The Fellows to whom Fleming addressed this communication should indeed have been more directly aware of David Ure's work. Six years earlier, his collection of specimens had been presented to the Royal Society of Edinburgh by John Stark (1779-1849), an Edinburgh printer and author of the frequently reprinted *Picture of Edinburgh*. An amateur naturalist no doubt, in comparison with the professionalism of someone like Fleming, Stark had none the less written a two-volume work on *Elements of Natural History*, published in 1828, the year of its author's election as a Fellow of the Royal Society of Edinburgh. (He had been a member of the Wernerian Natural History Society for seven years by then.) We do not yet know how Ure's collection came into Stark's hands. After its presentation to the Royal Society of Edinburgh it appears to have been less than adequately arranged and catalogued (Gray 1865, 46-7). Eventually, in 1910, the Society decided to hand it over to the Hunterian Museum in Glasgow, where it is still preserved (Fig. 2; Plate 2).

One more name may be added to the list of nineteenth-century witnesses to David Ure's place in the history of science. In 1859, Thomas Davidson, F.R.S. published in the monthly magazine *The Geologist* an account of *The Carboniferous System in Scotland characterized by its Brachiopoda*. In it he paid the following tribute to David Ure, the sincerity of which may be allowed to offset a certain lack of biographical accuracy:

'It is to the deservedly honoured name of a working weaver in Glasgow that science is indebted for the first account of a not inconsiderable number of the natural riches of one of the most productive coal-fields in Scotland. David Ure, while unemployed at his loom, was continually observing and collecting all that appeared to him worthy of notice; and in 1793 he published a very remarkable octavo volume entitled *The History of Rutherglen*

and *East Kilbride*, and in which will be found the first description and figures of about eleven of the most characteristic Carboniferous Brachiopoda. David Ure was acquainted with Fabius Colonna's *De Purpuro*, published in 1616, and adopted his term 'anomia' for the greater number of those shells which we now include among the Brachiopoda. In 1793, and for nearly half a century later, so little was known of the true characters of the numerous shells that compass the class, that it would be unreasonable to expect that Ure, with all that superior mind with which he was endowed, could do more than endeavour to class his shells according to what might appear to him to be their external resemblances. . . . Such an arrangement of the Brachiopoda would nowadays appear impossible, but in 1793 it was perfectly unavoidable as well as excusable. Ure's figures are very passable, and especially so for the time at which they were engraved' (Davidson 1859, 470) (Fig. 2).

Six years after the publication of Davidson's article, John Gray produced what remains the most comprehensive review of David Ure's work in the field of natural history (dedicated to William Ferguson of Kinmundy, one of the eleven original members of the Natural History Society of Glasgow). It would surely be of interest for someone properly instructed (as the present writer has no claim to be) to re-assess Ure's scientific significance. Certainly his work has not been fruitless even in quite recent times: the entries in the card-index in the Hunterian Museum in Glasgow show that items in his collection are still of interest to those actively working in fields which have, of course, been transformed out of recognition in the two centuries since Ure published his book. And Gray's words no doubt remain as true today as they were in 1865:

'the history of his researches must always remain valuable, as being the result solely of observation and careful inquiry, despite the errors into which he was occasionally led. . . . His *History*, then, ought always to be regarded as a striking instance of advancement in the direction of truth—a forerunner to that era in natural science especially, which was just commencing. As such it will ever be prized by the geologist' (Gray 1865, 58).

David Ure could not have been displeased by the fact that his *History of Rutherglen and East-Kilbride* was indeed sufficiently 'prized' for a handsome facsimile edition (together with Gray's 1865 *Biographical Notice*) to be published in 1981 by Glasgow Museums and Art Galleries. Apart from personal satisfaction, he would surely have been delighted by this evidence that, in words he used in a different

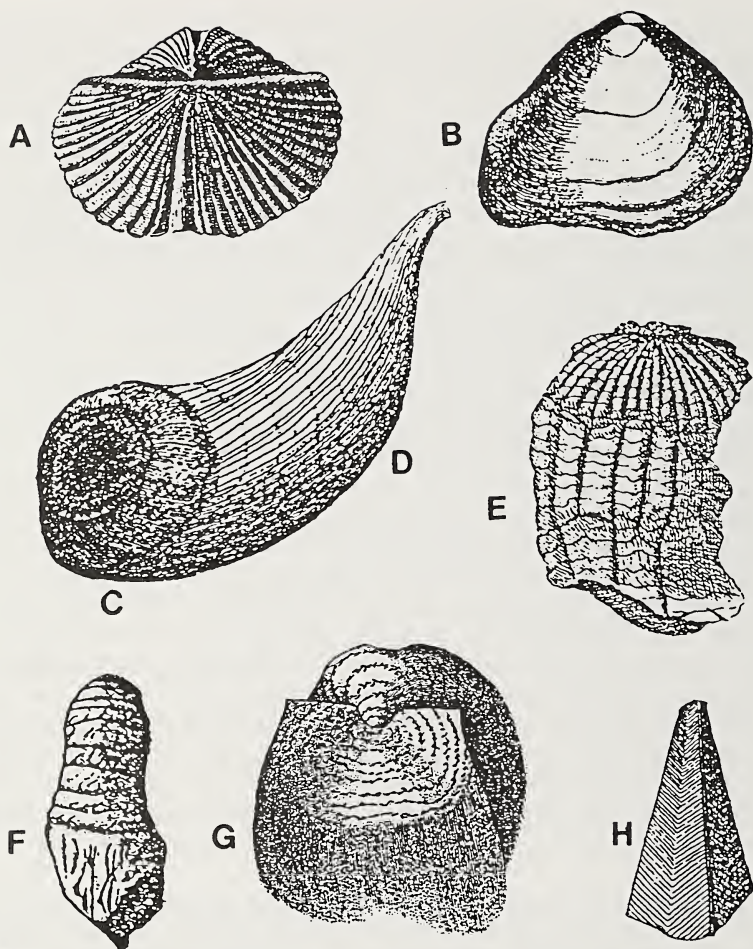


Fig. 2

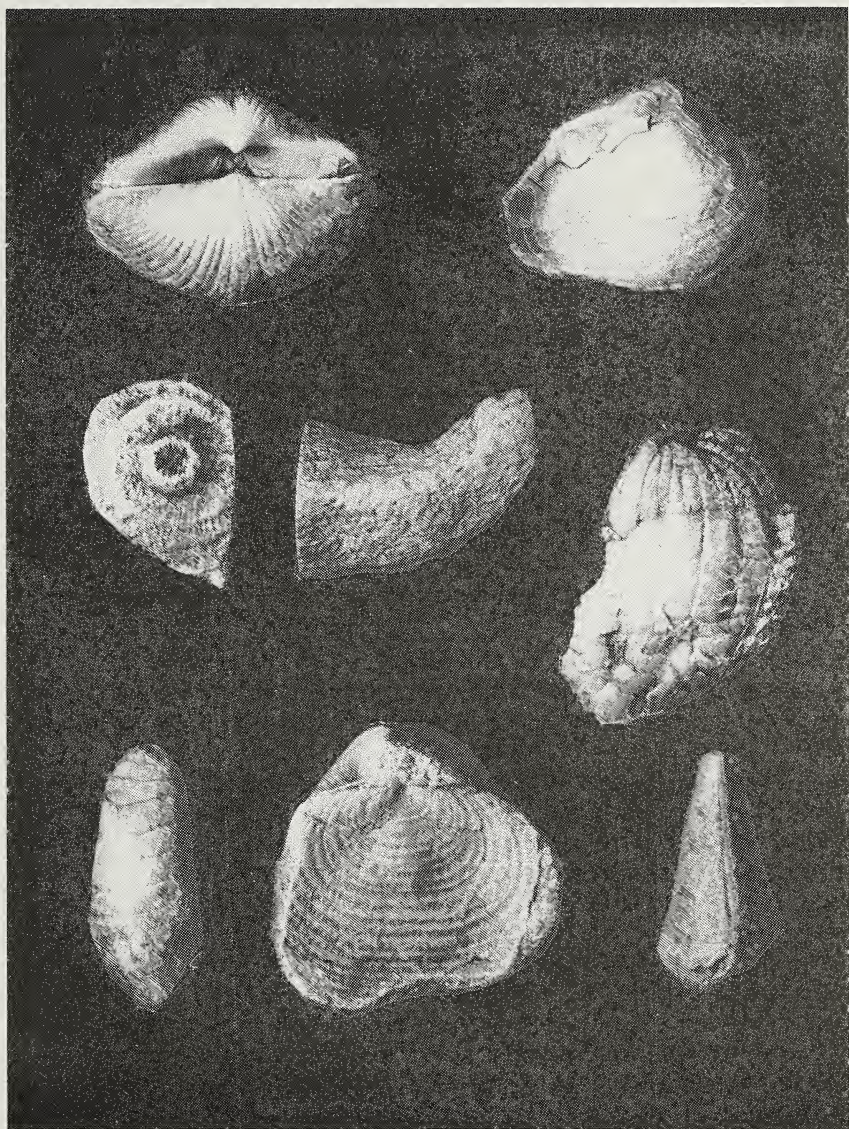
Drawing of fossils from David Ure's *The History of Rutherglen and East Kilbride* (1793) with, for comparison (Plate 2, opposite) photographs of the original specimens in the Hunterian Museum, Glasgow University, arranged similarly. Specimens and drawings are actual size; nomenclature has been brought up to date. (Photograph and names supplied by Museum authorities.)

(A) *Spirifera striatus* Martin, a lamp shell (Brachiopoda) (Ure plate 15: 1—ref. GLAHM L11905).

(B) *Carbonicola pseudorobusta*?, a bivalve (Mollusca) (Ure plate 15: 2—ref. GLAHM S35312).

(C-D) *Aulophyllum fungites* (Flemming), a coral (Cnidaria) (Ure plate 20: 6—ref. GLAHM C4366). This specimen has subsequently been sectioned to reveal the diagnostic internal structure of this species.

(E) ?*Parazeacrinites* sp., a crinoid (Echinodermata) (Ure plate 18: 13—ref. GLAHM E1593). (Drawing appears to be a mirror image of specimen.)



(F) Fish coprolite, fossil faeces (Ure plate 19: 1—GLAHM X1105).

(G) *Echinoconchus punctatus* (Sowerby), a lamp shell (Brachiopoda) (Ure plate 15: 7—ref. GLAHM L11096).

(H) *Conularia quadrisulcata* Sowerby, a conulariid (Cnidaria) (Ure plate 20: 7—ref. GLAHM C122011).

connection in 1791, 'every inhabitant of Glasgow . . . is not a Goth.'

Acknowledgments

My primary indebtedness is to the editor, Dr Ron Dobson, and to Mr Alastair Gunning of the Department of Natural History, Art Gallery and Museum, Kelvingrove, Glasgow, for their encouragement and help in preparing the article. I also have to thank the following for information, advice and assistance of various kinds: — Miss E. Allen, Qvist Curator, Hunterian Museum, Royal College of Surgeons of England; Dr Neil D. L. Clark, Curator of Palaeontology, Hunterian Museum, University of Glasgow; Dr William Duncan, Executive Secretary, Royal Society of Edinburgh; Rev. James Gilfillan, Minister of East Kilbride; Dr Bruce P. Lenman, Department of Modern History, University of St. Andrews; Mr John McLeish, Humanities Librarian, Central Library, East Kilbride; Mr William M. Niven, Millhouse, Eaglesham; Ms Elspeth M. Reid, Archives and Business Record Centre, University of Glasgow. Last but by no means least I have to thank my wife (David Ure's great-great-niece) for archival data relating to Ure's family history.

References

- DAVIDSON, T., 1859. The Carboniferous System in Scotland characterized by its brachiopoda. *The Geologist* 2: 461-77.
- FERGUSON, W., 1968. *Scotland: 1689 to the Present*. Oliver & Boyd, Edinburgh. x + 464 pages.
- FLEMING, J., 1859. *The Lithology of Edinburgh*. Kennedy, Edinburgh. viii + CIV (Memoir) + 102 pages.
- GRAY, J., 1865. *Biographical Notice of the Rev. David Ure; with an Examination, critical and detailed, of his History of Rutherglen and East Kilbride*. Hugh Hopkins, Glasgow. viii + 59 pages (reproduced with 1981 facsimile edition of Ure 1793).
- HEADRICK, J., 1807. *View of the Mineralogy, Agriculture, Manufactures and Fisheries of the Island of Arran*. Constable, Edinburgh; Murray, London. xvi + 396 (some copies 395) pages.
- HEADRICK, J., 1808. Biographical sketch of the late Rev. David Ure. *Scots Magazine* 70: 903-5. (Reprinted in Gray 1865, 17-21.)
- MAIR, J., 1950. *John Anderson, Pioneer of Technical Education and the College he founded*. John Smith & Son, Glasgow. xii + 162 pages.
- NIVEN, T. E., 1965. *East Kilbride: the History of Parish and Village*. Wilson, Guthrie & Lang, Glasgow. viii + 330 pages.
- PRIMROSE, J., 1898. *Strathbrock, or the History and Antiquities of the Parish of Uphall*. Andrew Elliot, Edinburgh; Bryce & Murray, Glasgow. xii + 120 pages.
- PRSE = *Proceedings of the Royal Society of Edinburgh*, 2 (1844-50).

- ROSS, W., 1883. *Busby and its Neighbourhood, including the parishes of Carmunnock, East Kilbride, Mearns, and Cathcart*. David Bryce & Son, Glasgow; Andrew Elliot, Edinburgh. x + 139 pages.
- SCOTT, H., (ed.) 1915-28. *Fasti Ecclesiae Scoticanæ*. Oliver & Boyd, Edinburgh. 7 vols.
- SINCLAIR, Sir J., (ed.) 1791-99. *Statistical Account of Scotland*. William Creech, Edinburgh. 21 vols.
- URE, D., 1793. *The History of Rutherglen and East-Kilbride*. David Niven, Glasgow. viii + 334 pages + 22-page list of subscribers (facsimile edition (with facsimile of Gray 1865), 1981, Glasgow Museums and Art Galleries).
- URE, D., 1794. *General View of the Agriculture in the County of Roxburgh*. B. Millan, London. 93 pages.
- URE, D., 1797. *General View of the Agriculture in the County of Kinross*. Mundell & Son, Edinburgh. 58 + 9 (appendix) pages.

Book Review

Collins Photoguide to Fossils

H. MAYR

Harper Collins, 1992, 256 pages, over 500 colour photographs, 22 black and white illustrations. Hardback, ISBN 0 00 219910 6, £14.99.

This attractive book has been well designed with the layman in mind. There is an introductory section which explains what fossils are and how they are formed. It then summarises the main fossil groups and the history of life on earth. This is followed by some useful tips on fossil collecting.

The bulk of the book is then given over to beautiful colour photographs of a very wide variety of both plant and animal fossils from all over the world. These are arranged systematically and range from microscopic radiolaria to the skulls of elephants! Accompanying each photograph is a paragraph of informative text about the genus concerned and further details about the actual specimens illustrated.

This book is not intended as an identification guide, but it is the type of book you can pick up and browse through with a great deal of pleasure. My one criticism would be that the index could have been a little more comprehensive, but this does not detract from what is a very interesting read for geologist and non-geologist alike.

RICHARD SUTCLIFFE

Book Review

Geological Excursions around Glasgow and Girvan

J. D. LAWSON and D. S. WEEDON

Geological Society of Glasgow, 1992, 495 pages, numerous maps and diagrams. Paperback, ISBN 0 902892 09 6, £9.00 (+ £1.20 postage from The Geological Society of Glasgow, Dept. of Geology and Applied Geology, University of Glasgow, Glasgow G12 8QQ).

It is 19 years since the publication of the previous excursion guide to the geology of the Glasgow area by the Geological Society of Glasgow. The appearance of a new version is therefore very welcome.

Although it draws on the old guide it would be misleading to think of this book as a new edition. It is not simply an update of the text to take into account new ideas and researches on geology. The scope of the book is very much broadened. After an extensive introductory chapter on the geological development of the Glasgow area which sets the framework for the remainder of the guide a total of 33 excursions are included, an increase of 14. Most of the old favourites are present normally with much more background explanation. The major change indicated by the title is the inclusion of a large section on the geology of Girvan and Ballantrae. Although not strictly in the Glasgow area it is easily accessible from the city and the seven excursions plus discussion of this classic geological area increase the appeal and usefulness of the guide.

The standard information listed for each excursion is a helpful new feature. Along with statements on the geological themes and features covered there are details on maps, type of terrain, distances and times involved and access. These all make easier the task of planning a successful trip.

The only drawback in having all this extra information at our disposal is the necessary increase in the size of the volume. At 495 pages it is not quite so readily slipped into a pocket during field trips. This is small compensation to pay and we are fortunate in having available such an excellent guide to the geology of our local area.

ALASTAIR GUNNING

Short Notes

Compiled by A. McG. Stirling

Botanical

Additions to the list of Mosses for the Isle of Muck, V.C.104

RUTH H. DOBSON and
N. G. HODGETTS

The following list of mosses collected by one of the authors (RHD) is additional to that given by Hodgetts (1992). As before, records are attributed to the 10km squares of the National Grid, NM37, 38, 47 and 48. Order and nomenclature follow Corley & Hill (1981).

Sphagnum magellanicum Brid. Am Maol lochan, 48. New to Small Isles (November 1983).

Sphagnum tenellum (Brid.) Brid. Acid wet heath below Druim Mor, 47. (February 1986).

Blindia acuta (Hedw.) Br. Eur. Flush near Achadh na Creige, 38. (November 1983).

Tortula ruralis subsp. *ruraliformis* (Besch.) Dix. (1). Gallanach Dunes, 48. (February 1983).

Barbula fallax Hedw. Dunes, Ard nan Uan, 48. (November 1983).

Rhizomnium punctatum (Hedw.) Kop. Rocks, Am Maol, 48. (May 1981).

Plagiomnium cuspidatum (Hedw.) Kop. Stones, Toaluinn Hill, 48. New to Muck (April 1988).

Philonotis calcarea (Br. Eur.) Schimp (1). Stream edge near Camas Mor, 47. New to Muck.

Homalia trichomanoides (Hedw.) Br. Eur. Rock outcrop in field, Gallanach, 48. New to Small Isles. (February 1984).

Cratoneuron commutatum var. *falcatum* (Brid.) Moenk. Stream edge near Camas Mor, 47. (July 1984).

Drepanocladus uncinatus (Hedw.) Warnst. Hillside, Fionn Ard, 47. (February 1984).

Calliergon cordifolium (Hedw.) Kindb. Lochan west of Central Wood, 47. (February 1983); Lochan, Horse Island, 38. New to Muck (May 1985).

Homalothecium lutescens (Hedw.) Robins. Gallanach Dunes, 48. (February 1983).

Brachythecium glareosum (Spruce) Br. Eur. (1). Dunes, Gallanach and Ard nan Uan, 48 (November 1983); Dunes, Lamb Island, 38. (February 1981); shell sand on east coast, 47. New to Muck (May 1985).

Brachythecium plumosum (Hedw.) Br. Eur. Rocks near Achadh na Creige, 38. (February 1984). Rocks on east coast near Eilean Dubh, 47. New to Muck (November 1983).

Cirriphyllum piliferum (Hedw.) Grout. Grass near jetty, east of Gallanach, 48. New to Muck (February 1984).

Eurhynchium swartzii var. *swartzii* (Turn.) Cum. Rocks at Am Maol, 48. (February 1984).

References

- CORLEY, M. F. V. & HILL, M. O., 1981. *Distribution of Bryophytes in the British Isles*. British Bryological Society, Cardiff.
 HODGETTS, N. G., 1992. The Natural History of the Muck Islands, North Ebeudes. 8. Bryophytes of Muck. *Glasg. Nat.* 22, 141-154.

***Polypodium* ferns on Ailsa Craig, Ayrshire V.C.75**

B. ZONFRILLO

In my recent paper on the Ferns of Ailsa Craig (*Glasg. Nat.* 1991, 22: 1, 59-64), I stated that all specimens of *Polypodium* collected referred to *Polypodium interjectum*, and this was indeed the case. However further collecting, at the suggestion of A. McG. Stirling, has revealed that *Polypodium vulgare* also occurs, although not in the same abundance as *interjectum*. Examination of specimens by A. McG. Stirling shows that the hybrid between the two species, *P. x mantoniae* is also to be found on Ailsa.

The exact status and distribution of these ferns on the island has yet to be established, but at present all can be found on the east facing slopes behind the Lighthouse. This brings the island's fern list to twelve species. Specimens have been deposited in the herbarium at the Botany Dept., Glasgow University.

***Veronica anagallis-aquatica* – an addition to the Flora of Glasgow**

MARGARET M. H. LYTH

During a GNHS excursion led by Dr J. H. Dickson on 4th July 1992, I found a small, stunted specimen of Water Speedwell (*Veronica anagallis-aquatica*) on the bank of the River Clyde near Carmyle.

A. Walker *et al* do not record the species in *Plants from the Kenmuir District of the Clyde 1815-1987* (*Glasg. Nat.* 1988, 21: 375-399) despite having undertaken a detailed study of the area in which the plant was found, nor was it recorded during the several years of field work for the *Flora of Glasgow* project in the 1980s. There are no records for the area shown in the *Atlas of the British Flora* (1990). It is possible that the plant, rare in the area, became visible due to a drop in the level of the Clyde after a spell of dry weather, which could also account for the stunted appearance.

Veronica anagallis-aquatica was not listed by Rev. David Ure in his chapter *List of Scarce and Indigenous Plants in Rutherglen and East Kilbride* in his *History of Rutherglen and East Kilbride* (1793), nor by Thomas Hopkirk in *Flora Glottiana* (1813), however, Roger Henedy

cites the plant as being found 'near Flenders, beyond Busby' in *The Clydesdale Flora* (1865).

Outwith the Flora of Glasgow study area a few records of the *Veronica* occur. In the Rev. William Patrick's *A Popular Description of the Indigenous Plants of Lanarkshire* (1831) the species is recorded as having been found at Newhouse, which is near the present M8, and a specimen in the University of Glasgow herbarium (GL) was collected by Dr Donald Patton from near the Clyde at Annieston, near Symington, by Biggar, in 1908. Peter Ewing, a resident of Uddingston, notes the occurrence of *V. anagallis-aquatica* in Lanarkshire in *The Glasgow Catalogue of Native and Established Plants* (1899). Although no details of locations are given in this work it is likely that Ewing was noting the occurrences cited by Patrick and Hennedy.

(Dr P. Macpherson has drawn to my attention a further Lanarkshire record from the Biggar/Coulter area, 10km square NT/03, D. J. McCosh (1959). *Compiler.*)

Magellan Ragwort at Cardowan

P. MACPHERSON

In August 1992, while in Caithness for the BSBI Field Meeting, I renewed by acquaintance with Magellan Ragwort (*Senecio smithii*), having previously seen it in that County in 1958.

In September 1992 the Botany Department of the University of Glasgow received a photograph of a potted plant grown from an offshoot of a large specimen found growing in the wild at Cardowan (Lanarkshire V.C. 77). Dr J. H. Dickson identified it as *S. smithii* and suggested that I might be interested in visiting the site.

I contacted Mr J. McAdam who had sent the photograph, and with him went to the area to locate the plant. He had first noticed the Ragwort in 1989. He frequently traverses that part during walks which he takes in the area, and does not think that the plant could have been present more than five years ago. The site is in marshy ground, the main associates being Reed Mace, Branched Bur-reed and Bottle Sedge. There are no other introduced species in the vicinity. The plant measures six feet in diameter and the tallest of the 18 flowering shoots was over three feet.

When paying respects to the plant in Caithness after an interval of 34 years, little did I expect to see it again within a month, especially in the vice-county for which I am plant recorder.

Magellan Ragwort has grown along the north coast of Caithness

and in the islands of Orkney and Shetland since the early part of this century. It is a native of Chile and Argentina. It is generally believed that it was brought back by either whalers or by shepherds, but another possibility is that it came through horticultural channels, having been introduced to Britain as a garden plant in the 1890s. Production of viable seed is very rare in Scotland and there is doubt as to whether it ever self-seeds. Certainly, despite the large number of flowers on the Cardowan specimen, there are no seedlings. Approximately one third of a mile to the east is the site of the old Cardowan House, the only remnant of which is the broken-down wall of its garden. There are, however, no garden relics and there is nothing to connect the Ragwort with the mansion house.

The origin of this isolated specimen of *S. smithii* would probably have remained a mystery had not J. H. Dickson remembered having been sent for identification a specimen by a resident of Craigend, also in the north east of Glasgow. Reference to the correspondence disclosed that it had come from a field adjoining the Wick River in Caithness. In view of the coincidence the individual has been contacted and he confirms that he introduced the plant to the Cardowan site in 1986.

Long-stalked Orache in Linthouse

P. MACPHERSON

Since 1985 I have known of the occurrence of Spear-leaved Orache (*Atriplex prostrata*) on the muddy banks of the River Clyde at Shieldhall, Linthouse and Whiteinch (Lanarkshire V.C. 77). In 1985 a similar plant, but with long triangular leaves was seen just west of Linthouse and a specimen sent for identification. Just this year it has been determined as Long-stalked Orache (*A. longipes*).

Despite a recent search of the area it has not been re-found although *A. prostrata* is still present.

A. longipes is a native of saltmarshes in England and southwest Scotland. The extension into the Clyde may well be related to the reduction in water pollution. Sea aster (*Aster tripolium*), a plant of similar habitats although much more common, was seen in 1985 in small quantity at Yoker (A. McG Stirling *et al.*) and at Shieldhall. By 1991 it was much more plentiful and had extended almost to the mouth of the Kelvin.

Although the Linthouse plant did not become established it is interesting to know that this rare *Atriplex* species has extended into Glasgow, making it worthwhile to keep a lookout for it, either on its own, or growing among its more common relative.

I am grateful to Mr J. M. Mullin for making the identification.

Recent plant records from Argyll

B. H. THOMPSON

Records of higher plants previously unrecorded in Mainland Argyll (V.C.98) continue to be made.

During the summer of 1992 Carlina Thistle (*Carlina vulgaris*) was found on basic cliffs of S.E. Kerrera. This discovery was not totally unexpected as the thistle grows in similar habitats in, for example, Ardnamurchan, Mull and Skye. It is surprising however that these cliffs of the raised shoreline have apparently been overlooked by botanists in the past. Other locally uncommon plants seen in the same area included Narrow-leaved Helleborine (*Cephalanthera longifolia*), Wood Melick (*Melica uniflora*), Burnet Rose (*Rosa pimpinellifolia*), Lesser Meadow-rue (*Thalictrum minus*), Wood Vetch (*Vicia sylvatica*) and Yew (*Taxus baccata*)—a single small tree pressed against the cliff.

Whorl-grass (*Catabrosa aquatica*), also new to the vice-country, has turned up at two sites on the Lynn of Lorne coast near Benderloch. It is surprising that this grass is so rare in Argyll as it is not infrequent in Kintyre and some of the inner hebridean islands. Perhaps the most significant find was Creeping Spearwort (*Ranunculus reptans*) on the shore of Loch Awe at Collaig, near Kilchrenan. This species was thought to have been displaced in the British Isles by the more vigorous hybrid *R. x levenensis* (Loch Leven Spearwort), the cross between *R. flammula* and *R. reptans* which has also been recorded on Loch Awe.

Several naturalised alien species have been recorded for the first time, including Pampas-grass (*Cortaderia selloana*) at Kilmory near Lochgilphead, Pott's Montbretia (*Crocasmia pottsii*) near Craobh Haven, Musk-mallow (*Malva moschata*) near Ford, Flowering Currant (*Ribes sanguineum*) near Minard, and Reflexed Stonecrop (*Sedum rupestre*) by Loch Melfort.

A second site was discovered for Rough Horsetail (*Equisetum hyemale*) and several new sites found for Adder's-tongue (*Ophioglossum vulgatum*) and the rare and elusive Bog Orchid (*Hammarbya paludosa*).

On the debit side Celery-leaved Buttercup (*Ranunculus sceleratus*) which was found for the first time in 1988 at a pond near Lochgoilhead, being infilled as a rubbish tip, has now been lost. Similarly the rare hybrid Walthamstow Yellow-cress (*Rorippa x armoracioides* = *R. sylvestris* x *R. austriaca*), has almost certainly gone from waste ground at Oban due to urban landscaping.

Zoological

Stenotus binotatus (F.) (Hem., Miridae) in Scotland

STEPHEN MORAN*

On 20 July 1990 while leading a group of local children on a 'bug hunt' at Fort Augustus, Inverness-shire, V.C.96 (NH 3709) I swept large numbers of the mirid bug *Stenotus binotatus* on an area of neglected amenity grassland. Southwood & Leston 1959 (*Land and Water Bugs of the British Isles*) give the distribution for this species as "Found in . . . England north to Yorkshire . . . more especially in the southern and western counties".

Staff at the Royal Museum of Scotland (RMS) kindly allowed me access to the Scottish Insect Records Index (SIRI) which produced no published references to *S. binotatus*. An inspection of the collections at the RMS, however, produced specimens collected by E. C. Pelham-Clinton at Port Appin, Argyll, V.C.98, 26 July 1958 and at Kirkcinner, Wigtownshire, V.C.74, 21 July 1963. A check with museums at Aberdeen, Dundee, Glasgow (both Kelvingrove and Hunterian) and Perth produced no further records. An additional record was made near Fasnakyle, Inverness-shire, V.C.96 (NH 2926) on 19 July 1992 by P. Kirby and S. J. J. Lambert.

From the available information it would appear that the Port Appin specimens were the first Scottish records and that the species is widespread but local in Scotland.

*c/o Inverness Museum and Art Gallery, Castle Wynd, Inverness IV2 3ED.

Minthea rugicollis (Walker) (Coleoptera; Lyctidae), an unusual imported power post beetle

E. G. HANCOCK

A local furniture retailer brought a turned piece of tropical hardwood containing beetles for identification into Glasgow Museum on 4 May 1992. The ready-made furniture had been imported direct from Malaysia and several items were showing signs of extensive infestation. The symptoms of powder post beetle were evident, but the adult insects, which were emerging in some numbers, were clearly not the ubiquitous *Lyctus brunneus* Stephens. The whole dorsal surface was liberally covered with flattened club-shaped scales, even on the legs and antennae. This description matches that of *Minthea rugicollis* (Walker) given

Corrigendum: page 282, line 28; for 'power' read 'powder'.

in Booth, R. G. *et al.* 1990, whose figure is reproduced here (Fig. 1).

This beetle is a pantropical pest of a variety of woods. It has been found in Britain on a few occasions as listed in Aitken, A. D., 1975 (*Insect Travellers*, 1. *Coleoptera*, Ministry of Agriculture, Fisheries and Food, Technical Bulletin No. 31, p 97). This gives a summary of insects found upon inspection of imported cargoes. *Minthea rugicollis* has been intercepted from sources in South America, Africa and South-east Asia. Specimens from this Glasgow occurrence were numerous and duplicates have been deposited in The Hunterian Museum collections (Glasgow University) and sent to the Royal Museum of Scotland (Edinburgh). Some hymenopterans which emerged from the wood, presumed to be parasitoids of this beetle, have been identified as *Doryctes* sp. (Braconidae) by Dr M. R. Shaw of the Royal Museum of Scotland.

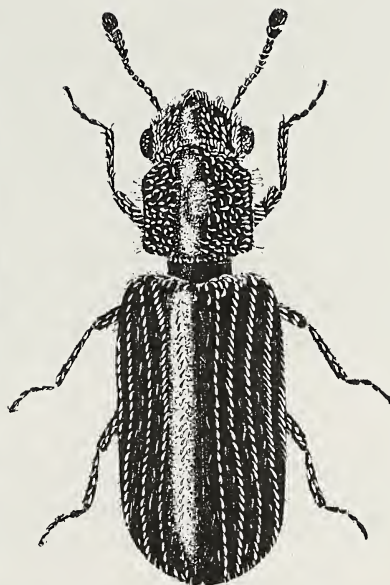


Fig. 1. *Minthea rugicollis* (Walker) (Reproduced with permission from Booth, R. G. *et al.* 1990, *ITE Guide to insects of importance to man*, 3. *Coleoptera*. International Institute of Entomology/Natural History Museum (C.A.B. International)).

Convolvulus Hawkmoth, *Agrius convolvuli* (L.), in 1992

E. G. HANCOCK

A specimen of this, one of the largest moths to be found in Britain, was brought into Glasgow Museums on 14 September 1992. Mr George McMaster had found it alive in his garden at Causewayhead, near Biggar, Lanarkshire (NT 0336). Less than a week later one was reported from Paisley, having been brought to the attention of the museum staff there. This species is only known as a migrant in Scotland and the last time it was noticed locally was referred to in this journal in 1986 (*Glasg. Nat.* 21: 307).

There are years in which certain migrant insects prove to be common, although these statistics are usually based on the numbers

observed in the south of England which are not always reflected this far north. The only other local specimen in the museum collection is from Cumbernauld on 16 September 1936, a year which is not otherwise known for an abundance of *Convolvulus* Hawkmoths. Also, the huge numbers of Clouded Yellow (*Colias croceus* (Geoffroy)) butterflies seen in Scotland during 1992 does not necessarily mean that there has been or will be a glut of records of all other migrants, although early indications are that this may be the case. A considerable number of *Convolvulus* Hawkmoths have been seen in north-east Scotland from August through to October (Dr M. Young; pers. comm.). At present there does not seem to be a correspondingly large number from the west. If anyone has any other records of this or other non-resident species we would like to hear from them.

Clouded Yellow Invasion, 1992

RICHARD SUTCLIFFE

1992 will go down as being the best ever year for the Clouded Yellow butterfly (*Colias croceus* (Geoffroy)) in Scotland since records began.

Normally there are only a handful of records for the species in Scotland even in a 'good' year. The butterflies (which originate in the Mediterranean area) normally travel north through England. In 1992 they appear to have entered Scotland from the west, having been blown out over the Atlantic by south-easterly winds. The first sighting came from St. Kilda on 12 May, and large numbers were observed on the mainland from 14 May onwards. These early butterflies bred over a wide area. After the initial invasion in May, numbers dropped off in June. From mid-July onwards, however, the butterflies started to build up again as the second brood appeared, and large numbers were again reported throughout August. At some localities, especially on the Solway and Ayrshire coasts, observers were reporting as many as 50 individual butterflies! Numbers again dropped off in September presumably as a result of the poor weather. The first frosts of October probably killed off most of the remaining individuals, and the last reported sightings were made on 12 October in Dumfriesshire, bringing to an end a fantastic butterfly year in Scotland.

At the time of writing, records are still coming in, but well over 700 individual butterflies have been reported from over 160 ten-kilometre squares, from Dumfriesshire to Caithness. A detailed account of the invasion is in preparation for inclusion in the next issue of *The Glasgow Naturalist*, and any records should be sent to Richard Sutcliffe at the Art Gallery and Museum, Kelvingrove, Glasgow G3 8AG.

Additional localities for the Purple Hairstreak butterfly

JOHN MITCHELL

Following on from the recent report of an apparently isolated population of the Purple Hairstreak *Quercusia quercus* (L.) being discovered at Garscadden Wood on the north side of Glasgow (*Glasg. Nat.* 22: 196), it seems worth placing on record two sites found in late July 1992 between Garscadden and the butterfly's principal stronghold in the oakwoods around Loch Lomond.

Dumgoyach, Strathblane. 30 July. A number of Purple Hairstreaks at tree-top height, readily observed from the cliff on the south-west flank of this well wooded volcanic plug. More hairstreaks were assembled on ash than oak, the probable attraction being aphid honeydew.

Mugdock Wood, Milngavie. 31 July. Two or three Purple Hairstreaks seen briefly near the top of a single oak on the south-west edge of the wood overlooking the Allander Water.

Both localities had been searched by the same observer on previous occasions, but without success, which gives some indication of the elusiveness of this high-flying butterfly.

Caddisflies (Trichoptera) from a light-trap in Newmilns, Ayrshire

E. G. HANCOCK

For a period spanning several years a Robinson pattern insect light trap was operated in the garden of Fred. R. Woodward, 68 Main Street, Newmilns, Ayrshire, in order to boost the knowledge of the fauna of this relatively poorly studied part of Scotland. At the bottom of the plot of land is the River Irvine and beyond an area of unmanaged woodland. A number of interesting records has resulted from those specimens which were boxed and brought into Glasgow Museums on an almost daily basis, and one of the orders which was prominent in the catches was the Trichoptera or caddisflies.

In 1989, I sent the collection to Liverpool Museums, the locus for the national mapping scheme for caddis where they were identified by Brenda Wallace in exchange for the opportunity to incorporate the data into the scheme and retain any specimens desired for reference. The following is the list as drawn up from the returned material. The term 'common' is used where the species is recorded more than five times, in which case only the months of capture are given. The same applies to 'fairly common' where from three to five occurrences are known. With species less frequent than this, the number of specimens and the actual dates are listed.

The nomenclature follows the standard checklist (Kloet & Hincks, 1964), with some updated names indicated in parenthesis.

RHYACOPHILIDAE

Rhyacophila dorsalis (Curtis), common, May-October.

R. oblitterata McLachlan, one, 4/8/1984.

GLOSSOSOMATIDAE

Glossosoma boltoni Curtis, two, 2/5/1986.

Agapetus ochripes Curtis, one, 19/6/1986; two, 29/6/1986 (formerly known as *A. comatus* (Pictet)).

HYDROPTILIDAE

Hydroptilus forcipata (Eaton), one 20/6/1984.

Allotrichia pallicornis (Eaton), common, June-July.

POLYCENTROPIDAE

Polycentropus flavomaculatus (Pictet), common, June.

Plectrocnemia conspersa (Curtis), one, 3/6/1983.

PSYCHOMYIIDAE

Tinodes waeneri (Linn.), one, 25/7/1985; one, 7/8/1985.

Psychomyia pusilla (Fabr.), two, 15/7/1986.

HYDROPSYCHIDAE

Hydropsyche siltalai Doehler, common, July (formerly confused with *instabilis* (Curtis)).

H. pellucidula (Curtis), common, May-June.

H. instabilis (Curtis), fairly common, June-July.

PHRYGANIDAE

Phryganea bipunctata Retzius, one, 29/6/1986 (formerly known as *striata* (Linn.)).

LIMNEPHILIDAE

Drusus annulatus Stephens, two, 30/6/1986.

Limnephilus elegans Curtis, one, 2/6/1984.

L. extricatus McLachlan, one, 7/6/1986.

L. flavicornis (Fabr.), one, 23/8/1984; one, 12/9/1984.

L. lunatus Curtis, one 13/8/1982; two, 12/9/1984.

L. sparsus Curtis, one, 31/5/1986.

Potamophylax latipennis (Curtis), fairly common, August.

P. cingulatus (Steph.), fairly common, August-September (formerly confused with *latipennis* Curtis)).

Halesus radiatus (Curtis), one, 13/8/1982.

H. digitatus (Schränk), three, 10/9/1985; one, 6/10/1986.

Stenophylax permistus McLachlan, one, 2/9/1985; one, 8/8/1986.

Chaetopteryx villosa (Fabr.), one, 26/10/1987.

LEPTOCERIDAE

Arthrripsodes bilineatus (Linn.), one, 19/5/1984; one, 30/7/1985.

SERICOSTOMATIDAE

Silo pallipes (Fabr.), one, 18/7/1984; one, 12/8/1985.

Goera pilosa (Fabr.), one, 29/6/1986.

Apart from two, all of these species have been recorded in the Clyde area for at least eighty years (Elliot, *et al.*, 1901), although not necessarily

from Ayrshire and not always with a degree of accuracy to allow them to be plotted on 10km square distribution maps. the two 'new' ones have recently been recognised as distinct from closely related species. Thus *Hydropsyche siltalai* Doepler, hitherto confused with *instabilis* Curtis was found to occur in Britain (Badcock, 1977). Both it and *instabilis* are now realised to be widely distributed and common in northern localities and upland stream sites. A similar situation applies to *Potamophylax cingulatus* Stephens so that although it is widespread there are few published records confirming its existence in Scotland.

References

- BADCOCK, R. M., 1977. The *Hydropsyche fulvipes*—*instabilis*—*saxonica* complex in Britain and the recognition of *H. siltalai*. *Entomologists' mon. Mag.*, 113: 23-29.
 ELLIOT, G. F. S. *et al.*, 1901. *Fauna, Flora and Geology of the Clyde Area*. British Association Handbook, Glasgow, pp.302-305.
 KLOET, G. S and HINCKS, W. D., 1964. A Checklist of British Insects (Edn. 2) Pt. 1: Small Orders and Hemiptera, *Handbk. Ident. Br. insects* XI(1), London.

The Slug, *Arion lusitanicus* Mabille in a Helensburgh garden

ALISON RUTHERFORD

During the summer of 1991 I noticed numbers of large, orange-coloured slugs in the garden of my house in east Helensburgh, Dunbartonshire, V.C.99. Although I had lived in this house since 1981 I had not observed them there in previous years. Fully grown specimens were similar in size to the familiar large black slug *Arion ater* (L.), and it was at first thought that the coloured slugs were merely a form of this common species. To establish its identity a typical specimen was taken to Fred Woodward at the Glasgow Museum, Kelvingrove, and it was then submitted to Miss S. M. Davies of Croydon, a specialist in the genus. Miss Davies has determined the Helensburgh slug as *Arion lusitanicus*, a species only distinguishable with certainty from other members of the genus, particularly colour forms of *Arion ater* by dissection and examination of the genitalia.

This is only the second Scottish record of *A. lusitanicus*, the other, from the Necropolis, Glasgow in 1977, also being of local interest. The species is otherwise known with certainty only from a few localities in the south of England from Devon to Surrey, and from some Irish localities.

A. lusitanicus is often associated with gardens, usually in the absence of other species of the genus. In damp weather the slugs emerge in the evening and can be found in large numbers on the garden paths.

They seem to cause little damage to garden plants, but have been observed to feed avidly on crushed individuals of the common garden snail *Helix aspersa* (Muller) and even on injured members of their own species and on dog faeces.

The Scottish occurrences are probably the result of sporadic casual introductions, and it will be of interest to observe any possible spread to neighbouring areas, although this is unlikely in the case of the Necropolis population in view of its isolated urban situation.

Suspected examples of *A. lusitanicus* should be submitted for detailed examination in view of the outward similarity to the 'rufus' form of *A. ater*. There has also been confusion with another species, *A. flagellus* Collinge, the distinguishing features of both species being discussed by Davies (1987). The distribution map for *A. lusitanicus* in Kerney (1976) should be interpreted with caution as a number of records of *A. flagellus* are almost certainly included.

References

- DAVIES, S. M., 1987. *Arion flagellus* Collinge and *A. lusitanicus* Mabille in the British Isles, a morphological, biological and taxonomic investigation. *J. Conch.* 32: 339-354.
 KERNEY, M. P. ed., 1976. *Atlas of the non-marine Mollusca of the British Isles*. Institute of Terrestrial Ecology, Cambridge.

Shelduck at the Endrick Mouth, Loch Lomond

JOHN MITCHELL

Although principally an estuarine species, the Shelduck *Tadorna tadorna* L. has been known to nest in the south-east corner of Loch Lomondside since 1877 (*Trans. Proc. Nat. Hist. Soc. Glas.* 4: 202). Feeding territories are held in the shallow productive waters surrounding the mouth of the River Endrick, nesting mainly taking place on nearby wooded islands. A study undertaken during the years 1975-1978 by Dr E. M. Bignal assisted by other Nature Conservancy Council staff showed the Shelduck nesting population in the Endrick Mouth area to be relatively stable at about 18 pairs, producing 78 ducklings in the most productive year of 1978. In addition, a flock of up to 70 non-breeding immature birds was regularly present during the season (NCC internal report). The timing of the project was opportune, for it coincided with a gradual build-up in the numbers of feral North American Mink *Mustela vison* Schreber on Loch Lomondside, most importantly subjecting the Shelduck nesting islands on the loch to the presence of a regular mammalian predator. Incidents of Mink killing incubating Shelduck were recorded (*W Nat.* 7: 47-53). Within the next ten years the Endrick Mouth

population of territory-holding Shelducks had been reduced by two-thirds, with as few as two broods of ducklings being seen in any one year. The former non-breeding flock of surplus birds dwindled away completely.

As part of a national Shelduck census organised by the Wildlife & Wetlands Trust, the Endrick Mouth was surveyed again during the spring and early summer of 1992. Only six territorial pairs were present, although it would appear that the majority, if not all, were successful in hatching-out young. By 21 June (and before other Shelduck family parties began drifting in from elsewhere on the loch to complicate the census), a total of 32 ducklings had been counted. This small recovery in the Shelduck's breeding success at the Endrick Mouth is encouraging, suggesting that the number of Mink present on the Shelduck nesting islands may now have stabilised at a lower level.

Kingfishers on the River Kelvin

BRIAN S. SKILLEN

The fishing success of the Kingfisher depends on a relatively short period of activity under water, and on the impetus and accuracy of the dive itself. It is therefore surprising that Kingfisher have been active about the River Kelvin which is not known for clear water.

My first sightings of a Kingfisher in the area was on Christmas Day 1983. The bird was seen near to the old North Woodside flint mill, on the lade almost immediately below the abutments of the former Queen Margaret Bridge. It dived steeply into the lade gate pool but there was no evidence that it caught any fish and it was shortly scared off by dog walkers.

It was not until September 1989 that I saw a Kingfisher again fishing, this time at the Regent Mill lade sluice, immediately below the Art Galleries. The sighting was on 5 September 1989 and the same bird was watched for a quarter-of-an-hour flying up and down the straight of the river between the "new" footbridge and old drive way bridge in Kelvingrove, on the 28 September 1989 between 7.15 a.m. and 7.30 a.m. The bird was using debris mid stream as vantage points but at no time dived into the river during the time of the observation. It was also very vocal.

A further sighting was made in the early morning of 7 November 1991 when the bird was seen diving and feeding in the "calm" waters of the sluice of the lade running to the Regent Mills, formerly on Bunhouse Road. This or another bird was seen about Queen Margaret Bridge towards Christmas 1991.

No further sightings were achieved until 8 March 1992 when a Kingfisher was seen making its way up river underneath the footbridge at Botanic Gardens. This bridge was being crossed by several people, none of whom saw the blue flash of the passing bird.

Over the period of the summer months two Kingfishers established nesting holes in the Botanic Gardens/Kirklee area. But the success of pairing of these birds is far from clear. Activity was then concentrated about the area of the River Kelvin within Botanic Gardens.

In July of this year the Kingfishers became active about the River Kelvin between Belmont Street Bridge and Kelvinbridge. This was a period of low water and Kingfisher were seen low down in reeds or on low lying trees and bushes between 16 and 23 July of this year. The first sighting was of particular note as a Kingfisher rose from stones immediately below Belmont Street Bridge. It flew off down river to land in trees on the opposite bank below the military barracks. The Kingfisher appeared to be working a pool of shallow water separated off from the main flow of the river by some stones. The sighting of the 23rd was also of interest as it appeared to be either a younger bird or a female for it was by no means as glossy Kingfisher blue as previous sightings.

A Kingfisher was also sighted on 4 August of this year, again close to Belmont Street Bridge. The river having risen after heavy rains the bird was sitting somewhat dejected on a branch sticking out of the water in mid stream. The waters of the River Kelvin were muddy brown and sighting fish could only have been difficult. With the increase in water and mud washed into the River Kelvin fishing activity was given up in the area of Belmont Street and the Kingfisher have temporarily(?) vacated that location. It would seem that fishing success of the Kelvin Kingfishers is dependent on chance pools and bank-side operations. The autumn and winter use of remaining mill lades suggests concentrated activity away from the main rush of the River Kelvin. Only the Cormorants seem to have had much success mid stream in the Kelvin and it would interesting to know the Kingfishers' accuracy and success rate given that observation did not suggest much real success. It is however encouraging that the River Kelvin is now able to support at least a pair of Kingfishers in the area of Botanic Gardens and Kelvingrove.

**Pine Martens at Inversnaid,
Loch Lomond-side**

M.I. TRUBRIDGE

During the summer of 1989, towards the end of the breeding season

for woodland birds, several nestboxes on the RSPB's reserve at Inversnaid were attacked by an unknown mammalian predator. In some cases the lid of the box was ripped off. Other boxes showed signs of attack with teeth marks clearly visible on the lids and claw rakings on the sides. Scuff marks were also noted where the animal climbed the trees.

The situation deteriorated the following year, when from a total of 56 occupied nestboxes, 25 were predated and a further 14 were deserted after signs of an attack. The main bird species to be affected were Pied Flycatchers, but Blue Tits and Great Tits also suffered. Generally the lids of the nestboxes were forcibly removed and the contents ransacked, occasionally an adult bird was also taken off the nest. Where the animal was unable to gain access by the lid, nests were pulled out through the hole.

By now the predator had been positively identified as a Pine Marten by droppings. During the winter of 1990/91, attempts were made to deter further Pine Marten attacks on nestboxes.

Firstly, all boxes had their lids re-inforced by tying wire over the lid. In many cases this prevented the animal from gaining access to the box from the top. However, the Pine Marten then put its paw through the entrance hole and dragged the nest out, sometimes complete with contents.

Where the animal was unable to get into the box by either method, the birds deserted due to disturbance from these attacks.

Secondly, nine suspended nestboxes were erected, hung on the end of a piece of fence wire. Although these boxes were accepted by the birds (six were used by Pied Flycatchers, Blue Tits and Great Tits), the Pine Marten still managed to get into three of them.

The final figures for the 1991 season made depressing reading — out of 57 occupied nestboxes, 35 were predated and 3 were deserted. By now it was apparent that the Pine Marten was here to stay and that nestboxes had become lunchboxes. During the following winter, many boxes were closed down and renewed attempts were made to improve the hanging boxes. In the summer of 1992, 31 boxes were occupied, including all 10 suspended boxes. The Pine Marten accounted for 21 of them, with only one of the hanging boxes being successful. During the season an attempt was made to photograph the animal at work by Don MacCaskill. He succeeded on his first visit to Inversnaid, producing a picture of a Pine Marten standing on top of a nestbox trying to get in. This in fact was the first irrefutable evidence of the presence of Pine Marten — to date no one has actually seen one at Inversnaid. However,

judging by the amount of droppings around, it would appear that there are several martens on the reserve, probably a family group. It certainly looks as though they are here to stay and that nestboxes are a thing of the past.

The last dated record for Pine Martens resident on Loch Lomondside was 1832, when a pair was trapped at Rosdhu near Luss (correspondence of John Colquhoun March 5 1880 in the J. A. Harvie-Brown papers). In recent years the Pine Marten has been slowly expanding its range in Scotland, spreading out from its stronghold in the north of the country. This is probably due to better protection for the animal. Under the Wildlife and Countryside Act 1981, the Pine Marten was only partly protected in as much as it could not be killed by certain methods. However, since the Quinquennial Review, the Secretary of State for the Environment accepted recommendations that the Pine Marten should be fully protected. It is now an offence to kill or injure this animal as well as to disturb its breeding site. This is obviously good news for the Pine Marten but not such good news for birds using nestboxes.

(I am indebted to Mr J. Mitchell who reports that in early July 1992 a single Pine Marten was recorded on the opposite side of the loch at Inveruglas, the animal being observed at close quarters by Mr and Mrs J. B. Duncan. To date there have been no reported attacks on the Pied Flycatcher nest-boxes in nearby Kenmore Wood. *Compiler*)

Book Reviews

List of Vascular Plants of the British Isles

DOUGLAS H. KENT

Botanical Society of the British Isles, London, 1992, 384 pages.
Limpback, ISBN 0 90115 821 6, £11.50.

This definitive reference work brings up to date the British list of flowering plants and ferns, replacing the now outdated compilation by J. E. Dandy published in 1958. It includes all native species and a considerable number of naturalised and casual introductions. The order of families and species conforms with the latest taxonomic views, as does the nomenclature employed, all coinciding with the treatment adopted in *The New Flora of the British Isles* (Stace 1992). This has necessitated the introduction of many unfamiliar 'new' names, sometimes in the case of very familiar native plants, e.g. *Silene maritima* (now *S. uniflora*) and *Thymus praecox* (now *T. polytrichus*). No doubt it will take some time to adjust to these changes.

The list sets a much welcomed standard for local flora and check list compilers and others with an interest in the British Flora who have long felt the need of a replacement for Dandy, admirable though the latter was in its day.

A. McG. STIRLING

Checklist of the Plants of Perthshire

R. A. H. SMITH, N. F. STEWART, N. W. TAYLOR and R. E. THOMAS

Perthshire Society of Natural Science, 1992, 69 pages, index and map. Softback, ISBN 0 9513261 2 0, £5.00

For recording purposes Perthshire is divided into three Vice Counties which cover an area which is greater than the old Counties of Perthshire and Clackmannanshire. Three of the authors are recorders for these Vice Counties.

The booklet has an introductory chapter on geography, geology and climate. The area has a wide variety of rocks and the arctic-alpine flora of Breadalbane is of international fame. At lower levels habitats include river gorges, lochs, fens, peatlands and estuarine salt-marshes. This, plus the differences in climate throughout the area, results in floristic diversity and makes the region rich in native flora.

The Checklist gives the plants in alphabetical order of the scientific names. There is an index of the English names. The records cover all the vascular plants and charophytes growing wild with indication as to whether they occupy or have occurred in each V.C. They have been collated on a 5x5km square basis. There is an added symbol to give an indication of abundance. There are site comments for most of the species though for national rarities these are suitably vague.

The booklet is one of the best of its type and as such is highly recommended. The quality of production is excellent. I have one minor quibble, the lack of title on the spine.

P. MACPHERSON

New Flora of the British Isles

CLIVE A. STACE

Cambridge University Press, 1992. 1226 pages, line drawings, Paperback, ISBN 0 521 42793 2, £24.95.

The welcome arrival of Professor Clive Stace's *New Flora* brings together, in one volume, a wealth of information on the British flora. The author hoped the book would be complete, up-to-date, user-friendly and reasonably priced; he seems to have achieved this.

The result is an extensive and thorough, if somewhat daunting, coverage of 2990 species, 197 extra subspecies and 559 hybrids, with brief mention of 564 marginal species. It avoids unnecessary prior discriminatory selection on the plants 'residential' status.

The identification of any plant found growing wild in the British Isles is a fundamental goal of the book, and the keys provide the solid basis for the achievement of this. Many have been written anew, and the longer ones sub-divided. The numerous illustrations are valuable additions, although many of the photographs are unhelpful. The species text is deliberately brief and diagnostic, but lacks the detail of previous Floras, and therefore may not help when the key fails.

The text is concise, and not unnecessarily technical, with useful supplementary and cautionary guidelines. Conventions and reasoning behind the text are succinctly and clearly defined. There are several nomenclatural and taxonomic changes and the systematic order will be unfamiliar to many; however these changes have been co-ordinated with other systematic works, and will hopefully provide a stable, standard future reference source. The use of standard English names, although justified by the author, may not meet with popular approval.

Sheer volume of data and need for low costs, have resulted in a rather packed page format and thick 'Excursion' book-size, which will not be everyone's ideal field companion. There are some minor errors in the text, but the general thoroughness and accuracy of the vast amount of data is to be admired.

The beginner may find the book difficult to use, but it is an affordable, standard reference that no one who seriously wants to understand and appreciate the British Flora can ignore.

KEITH WATSON

A Field Guide to the Rare Birds of Britain and Europe

IAN LEWINGTON, PER ALSTROM and PETER COLSTON
Harper Collins, 1991, 448 pages, black and white drawings and colour plates. Hardback, ISBN 0 00 219917 3, £14.99.

An indispensable supplement to the bird-watcher's standard companion—Peterson's *Field Guide to the Birds of Britain and Europe*. The work is a compilation of some 300 species accounts, covering both the rarer breeding birds and vagrants that have been reliably recorded in Europe on at least one occasion. All the facts and figures are here—description of seasonal plumages, number and dates of documented sightings—complete with superb colour paintings of the birds by Ian Lewington. A veritable *vade mecum* for the dedicated rarity-hunter.

JOHN MITCHELL

Endangered Birds

JAMES FERGUSON-LEES and EMMA FAULL

George Philip, 1992, 191 pages, 103 colour illustrations. Hardback, ISBN 0 540 01248 3, £19.99.

Much more than a coffee-table book, this beautifully illustrated volume gives a masterly review of the distribution of birds in the world, of the problems they face, and the current decline of so many species. These trends of bird populations which are so often at the top of food chains give a general warning quite apart from aesthetic and moral considerations. Nine zoogeographical regions of the world are described together with their indigenous families of birds, followed by reviews for each region of introduced species, which often compete with, displace or even predate the natives, those (over 35) known to have become extinct this century, and those (over 100) currently under serious threat.

These potential 'laundry lists' of over 1000 species for which there is concern are made readable by grouping, by using mainly common names, and by lucid, interesting narrative accounts of the behaviour and requirements of the birds. These are related to the main sources of threat, which are so largely but not exclusively man-made. Most of the paintings colourfully combine portraiture with background habitat, each accompanied by textual description of the bird illustrated, of the group to which it belongs, and of notable threats and trends.

The zoogeographical regions used in the book are the same as those used in Mountfort and Arlott's *Rare Birds of the World* which is listed among the 39 references in the bibliography.

NORMAN R. GRIST

Newman's Birds of Southern Africa 1991 Update

KENNETH NEWMAN

Harper Collins, 480 pages, numerous paintings, colour illustrations and maps. Hardback, ISBN 0 00 219950 5, £14.99.

Essentially this is a field guide to the birds of the southern African sub-region but it also incorporates the sub-antarctic islands and Tristan Da Cunha. It is a well produced guide entirely in colour by the artist/author. A few irritating points prevent this from being the ideal guide it should be. Firstly the birds are not arranged in systematic order, and the Tristan Da Cunha birds and 'Recent Vagrants' are appended front and back of the main group, making things rather idiosyncratic. The use of long unhyphenated names such as Chestnutbacked Finchlark will do little for the English language in developing parts of southern Africa. The Short-tailed Pipit and White-eared Barbet are hyphenated!

Most birds are well illustrated or described but a few are not. The Little Shearwater has a longer, pale bluish bill than that shown, and the juvenile plumages of terns do not appear to exist. These criticisms apart, I would not go to southern Africa without this book. For what it contains it is well worth the asking price.

BERNARD ZONFRILLO

In Search of Arctic Birds

RICHARD VAUGHAN

T. & A. D. Poyser, London, 1992. 431 pages, 40 maps, 73 black and white photographs plus many line drawings by Gunnar Brosewitz. Hardback, ISBN 0 85661 071 2, £20.00.

In Search of Arctic Birds maintains the high standards set by previous books from Poyser, though unusually, instead of being devoted solely to birds it gives a historical perspective of man's relationship with and researches into Arctic birdlife in a wide ranging series of well researched topics.

Beginning with a chapter defining 'the Arctic' it deals with its climate, the structure of Arctic avifauna and its adaptation to its environment. Thereafter the author studies the early inhabitants, whalers and explorers, their impact on the birds and the increasing body of knowledge gathered by successive expeditions not only into Arctic North America and Greenland but Russian Siberia.

The birds themselves are examined in a series of detailed essays covering the family groups and notable species rather than as a bird list though records of every species ever encountered in the Arctic are included. The book continues with a discussion of present day conservation and its conflict with the growth of tourism and survival hunting. Useful first hand information on birdwatching trips to the Arctic is included as well as hints on dealing with mosquitoes and polar bears!

Vaughan's own photographs enrich the text with 73 black and white plates of bird behaviour as well as portraits supplemented by many fresh and lively line drawings by Gunnar Brosewitz. Accompanying these are 40 informative maps.

While this book will become compulsory reading for all visiting birdwatchers to the Arctic and is undoubtedly a specialist text, it contains much very readable matter to interest the general reader and armchair ornithologist.

THOMAS DANIELS

The Cambridge Encyclopedia of Ornithology

Eds M. BROOKE and T. BIRKHEAD

Cambridge University Press, 1991, 362 pages, colour illustrations, maps and diagrams. Hardback, ISBN 0 521 36205 9, £24.95.

A large reference book on birds which is more than just a coffee-table book. It has a distinguished team of contributors who have covered most aspects of modern ornithology. There are chapters on anatomy and physiology, flight, fossils, feeding, migration, behaviour and much more. I also like the additional chapters on 'People and Birds' which included birds in art and literature and the history of human interest in birds.

This book is for those who seek more than just pretty pictures of birds. The whole book serves as a good grounding in the fundamentals of ornithology. The price is by no means excessive for such a production and I would highly recommend it as a modern reference work for general ornithology.

BERNARD ZONFRILLO

The Birds of Fair Isle

J. N. DYMOND

Private publication, 1991, 141 pp, maps, numerous line drawings and graphs. Softback, ISBN 0 9518414 0 8, £11.95.

After a short introduction giving the history of bird observations in Fair Isle since 1905 and the methods used to obtain the data, the bulk of this volume presents a detailed systematic bird list which includes all 345 species recorded during the period 1948-1990. Included in these are graphs showing fluctuations in numbers of many of the 25 regular breeding species, histograms portraying seasonal occurrence and migration patterns of most species except vagrants, details of regular movements and ringing recoveries.

This attractively produced book will be useful to all interested in bird observatories, island bird life and migration. It provides essential information for all visitors to this Mecca of birders.

The book is available from main national ornithological and natural history book dealers and from some bookshops. It can also be purchased direct from the author at Burgadies, South Punds, Levenwick, Shetland, ZE2 9HX (p&p £1.00).

RUTH H. DOBSON

Leopard

GERALD HINDE

Harper Collins, London, 1992, 192 pages, many colour photographs, map, drawings. Hardback, ISBN 000 219936 X, £19.99.

The author of this luxurious volume, having relinquished his successful business as a motor distributor in South Africa, recently turned to the study of African wildlife and is now fast making his name as a leading wildlife photographer. In the main part of his text, he records his own observations of five individual leopards in the Kruger National Park, South Africa. Details of many aspects of leopard life including, hunting, prey selection, feeding, mating, rearing of the young, territoriality, communication, and rivalry between individuals are faithfully recorded and the interrelationships of leopards and other predators, such as lions and hyenas, are discussed. The narrative is enlivened with fascinating 'tales of the bush' and the problems and dangers of such work are well illustrated—the author stood his ground (or rather sat as he was in an open-sided Land Rover) while a male leopard approached and sniffed his boots: on another occasion his parents had a near-tragic encounter with an aggressive Cape Buffalo.

The text is well written in non-technical language and there are over 100 of the author's excellent colour photographs. Faults are few—the term 'interbreeding' is used meaning 'inbreeding' and it would be preferred if publishers would not split colour plates across two pages unnecessarily (e.g. pp.138-9).

This is a delightful book and is highly recommended reading for amateur and professional alike.

RONALD M. DOBSON

The Illustrated Encyclopaedia of Shells

KENNETH R. WYE

Headline Book Publishing PLC, 1991, 288 pages, colour photographs, diagrams and maps. Hardback, ISBN 0 7472 0468 3, £19.95.

The first thing that strikes the reader of this book is the superb quality of the photographs, most of which were taken by Paul Forrester. Certainly, they are superior to those of any other shell guide that I have read. The layout of the book is also of a high standard—as well as the identification guide (which constitutes the bulk of the book)—there are short sections on molluscs in the fossil record, the basic biology and taxonomy of the phylum Mollusca, and the setting up of a shell collection. There is also a brief section on conservation, including 'A Sheller's Creed', which budding conchologists would be well advised to read! For those wishing to delve deeper into the field, there is a (rather short) bibliography, as well as a list of shell-collecting societies, etc., at the back of the book.

Now to the down side. The book is rather expensive, at a retail price of £19.95, and features only 1200 specimens, compared with almost 4000 in the identically-priced *A Collector's Guide to Seashells of the World* (by Jerome M. Eisenberg, Bloomsbury Books, 1981). Having said that, the photographic quality of the latter is inferior, as are the notes accompanying each specimen.

The author's use of small pictograms beneath each photograph, denoting features such as rarity/abundance and depth at which the species occurs, is not unique to this book, and in fact appears a little cursory. Certainly, the addition of a pictogram denoting a venomous species such as some of the cone shells, would have been welcome.

Despite these shortfalls, this is a handsome and well-written book, which should fulfil the needs of the amateur shell-collector. If you're thinking of saving up for just one book on the subject, you could do a lot worse than this one.

JONATHAN MORAN

Spiders: An Illustrated Guide

ROD PRESTON-MAFHAM

Blandford, London, 1991, 144 pp, many colour plates and line drawings. Hardback, ISBN 0 7137 2303 3, £16.95.

This book succeeds in presenting much good zoological information in an attractive and popular format. Starting with the classification and origins of the Arachnida it proceeds to sections on the structure and physiology of spiders including topics such as silk and venom production. Short accounts of scorpions and other arachnids are followed by more extended treatments of spiders under the headings 'Courtship and Mating', 'The Life Cycle', 'Prey Capture', 'Defensive Adaptations', 'Conservation' and 'Observation'. Interpolated are two-page displays of 'The Desert Arachnids', 'Woodland Spiders', 'Watery Spiders' and 'Tropical Forest Spiders' and their habitats. A family identification chart, a glossary and an index complete the book.

The text deals with spiders on a world-wide basis and contains a wealth of not easily available information. The general presentation and standards of illustration are excellent but there are irritating faults e.g.s.: harvestmen are Opiliones, not Opiolines (pp. 12, 15, 43, 143); 'cloaca' (p. 22) is incorrect; legends to illustrations are transposed (pp. 42, 52); pseudoscorpions have poisonous pedipalps, not jaws (p. 43); inch-mm conversions are wrong (p. 62); drawings are inverted and wrongly numbered (p. 85); the diagram of a pooter is missing (p. 134). More seriously, there are no references, so that the reader can neither easily verify facts nor extend his knowledge. This is particularly frustrating as frequent allusions to recent discoveries are made. Addresses of the British and American Arachnological Societies are given however.

RONALD M. DOBSON

The Hemiptera, or True Bugs

W. R. DOLLING

Natural History Publications, Oxford University Press, 1991, 274 pages, numerous drawings, 8 colour plates. Hardback, ISBN 0 19 854016 7, £40.00.

The Hemiptera, or True Bugs (to distinguish them from what many people refer to as 'bugs' in a non-scientific way), are an important order of insects. Their one common characteristic is the possession of mouthparts of the piercing and sucking kind. These have allowed them to evolve as widely distributed plant feeders, blood suckers or predators of other invertebrates. They are of great importance in economic terms of human beings, embracing such familiar, if unpopular, insects as whitefly, aphids, scales, bed bugs and assassins. There are also a number of attractive and benign species to balance the equation. Approximately 80,000 species are currently known in the world of which about 1700 occur in Britain. This book contains 19 chapters detailing the biology, natural history and classification of bugs. There is a glossary, an extensive bibliography and a rather brief index. Excellent line drawings accompany the text and a handful of colour photographs show some of the living insects. The text also allows the reader to identify any bug in the world to family level, such is the detail in the appropriate chapter. Actual keys are included for British families.

This book achieves what it intends to do, that is provide a synthesis of existing knowledge in a readable form with something of interest to every naturalist as well as to the professional biologist. The information contained in it is otherwise scattered in mostly obscure sources or unobtainable elsewhere. The Foreword states it to be one a planned series and indeed, companion volumes on the Hymenoptera and Lepidoptera have already been published. Such a set of volumes, when complete, will form an encyclopaedia of entomological knowledge and be an asset to any library, public or personal. This is the sort of book which will encourage more people to take an interest in insects and perhaps to study them. It is highly recommended.

E. G. HANCOCK

A Field Guide to the Wildlife of the Falkland Islands and South Georgia

IAN J. STRANGE

Harper Collins, 1992, 188 pages, colour illustrations, drawings, photographs and maps. Hardback, ISBN 0 00 219839 8, £14.99.

In this very readable, genuinely pocket-sized volume, the author, a long-term resident and wildlife enthusiast, describes all aspects of the Islands' flora and fauna. The lengthy introduction details climate, marine environment, plant habitats, the effect of Man's activities, both good and bad, and present conservation plans. Check lists, descriptions and illustrations, many in colour, are given of all species of birds and mammals, both native and introduced, followed by a selection of plant and fish species and a small number of invertebrates, concentrating on those which are important as food species.

It is a pity that the complete list of plants referred to was not included. There is scope for further work to increase the knowledge of invertebrates. Maps and drawings liberally distributed throughout the text add greatly to the volume which is essential to visitors to the Islands and also of interest to island lovers who cannot venture so far.

RUTH H. DOBSON

The Forth Naturalist and Historian, Volume 15, 1992. ISBN 0 9514147 8 X, £4.50.

The librarian received the latest volume in mid-November 1992. Running to 124 pages it includes articles of historical, archaeological, natural history and conservation interest.

The issue leads off with an essay on 'Global Warming: Reality or Bad Dream?' This article, based on a lecture given by the author to the *Royal Pharmaceutical Society*, advocates playing safe: although the reality of global warming is not yet certain, steps taken now to reduce emissions of greenhouse gases would be prudent.

Contributions of particular interest to natural historians are 'A Check List of Birds of Central Scotland'; the 'Forth Area Bird Report, 1991'; 'Tropical Water Fern *Azolla filiculoides* at Airthrey Loch, Stirling University' and 'Environmental Notes'.

Other articles deal with the Weather of 1991; Prehistoric Rock Art in the Menteith area of Central Scotland; Saint Margaret—queen of Scotland; the Communion Service in Georgian Stirlingshire; Quoiting in Central Scotland and Alloa—the Port, Ships and Shipbuilding.

Books on Exploring Scottish History; Enchantment of the Trossachs; Concise History of the Church in Alloa and Alloa in Georgian Times are noted.

The *Forth Naturalist and Historian* is available from the Hon. Editor, L. Corbett, University of Stirling, FK9 4LA.

RONALD M. DOBSON

Watching Wildlife—a Field Guide to the Wildlife Habitats of Britain

GEOFFREY YOUNG and ELAINE FRANKS

George Philip, 1992, 223 pages, numerous colour illustrations and drawings. Hardback, ISBN 0 540 01262 9, £14.99.

This book is written by the journalist founder of WATCH and published under the aegis of the RSNC, so we might expect a populist survey of the opportunities for observing wildlife in Britain, suitable for attracting and stimulating new amateurs. So it is, an 'informative and accessible' (D. Attenborough) overview of the range of habitats in Britain, giving a gist of their ecology and history but without great detail. Lacking the typical curt notes of a 'Field Guide,' the sub-title misleads, nonetheless it could be used in the field particularly on holiday in an unfamiliar area, or just to browse. It is let down by the index, and a lack of any bibliography, and I'm not sure the Address list is much help either (especially as the SWT have moved already). I liked Franks' illustrations, sketchy but with a good naturalistic feel and am not surprised to note that she began painting aged four.

KEITH COHEN

The Great Wood of Caledon

HUGH MILES and BRIAN JACKSON

Lanark, Colin Baxter, 1991, 112 pages, black and white and colour illustrations, photographs, maps, bibliography. Hardback, ISBN 0 94 8611 267, £20.

This delightfully written book traces the history of the Caledonian Forest from the Ice Age to today. The predation of Man on the forest over the years is described as well as his efforts at management and conservation. There is a fascinating glimpse of the variety and abundance of the wild life that occupies the woods, while the problems faced by red deer are noted. Keith Brockie's watercolour and black and white illustrations are a pleasure to look at and study. The colour photographs are of a high quality. It is a pity that some of the illustrations are uncaptioned.

MARGARET M. H. LYTH

The Good Zoo Guide

JOHN IRONMONGER

Collins Natural History, 1992, 208 pages, line drawings, map.
Softback, ISBN 0 00 219921 1, £7.99.

Intrigued by the heading 'How Green are our Zoos,' I dipped in—and read on with increasing interest.

The Good Zoo Guide explores how well zoos are facing up to their changing role. The author points out: 'These days recreation tends to be considered insufficient justification for depriving animals of their freedom.'

Modern zoos have expanded their objectives to include conservation, education, research and recreation, and in Part 1 each of these issues is discussed, ending with a section 'Are zoos Cruel?' Part 2 examines some of the most important species seen in Britain's zoos, and how zoo conditions have changed as our understanding of the biology of the living animals has developed. It made fascinating reading. From gorillas (not scientifically described until 1847) to polar bears; killer whales to penguins, this section is packed with the sort of information everyone wants to know—but that standard animals books do not contain. Part 3 explains the 'star ratings' used to convey information about the 31 'best' zoos in Britain, listed alphabetically in Part 4. I admit that I did read the entries for Glasgow and Edinburgh first, but soon found myself subconsciously planning the route of my next trip south to include a visit to several zoos. Part 5 gives a table of where to see the 350 species of mammals housed in Britain's zoos and Part 6 gives a county by county list of how to find the zoos, safari parks, wildlife parks, bird gardens, butterfly houses and aquaria.

If you like visiting zoos, this book offers an invaluable guide to what you can expect to see in them. If your feelings are lukewarm, then the insight it gives into the questions of keeping animals in captivity make it well worth reading. Its beautifully drawn black and white illustrations are a bonus.

LYN DUNACHIE

A Natural History of the Lakes, Tarns and Streams of the English Lake District

GEOFFREY FRYER

Calligraphy by Sharon Murphy

Freshwater Biological Association, 1992. 361 pages, numerous line drawings and diagrams.

Softback, ISBN 0 90038650 9, £18.00 (incl. p. & p.)

Guides to the English Lake District seem to be developing a very characteristic and attractive style. First Wainwright's guides to the mountains and walks of the area and now this guide to the waters are presented in a beautifully hand written form, well illustrated with line drawings and sketches. In this case the presentation means that a serious and quite academic subject is made more accessible to the general reader.

Although this is called a 'Natural History' of the waters of the Lake District, it is really much broader and deeper than that. The first third of the book provides a description of the area, the processes which formed the lakes and rivers and the fascinating and complex interactions which are going on in the waters. In this section the book concentrates on the lakes more than the rivers — in part because the story of the processes in lakes is more complex and better understood. The explanations are very clear and well written, and although the examples are from the Lake District, the principles all relate to Scottish waters.

The latter part of the book consists of a description of the range of animals and plants which inhabit these waters. Many of these are microscopic or so small that they are easily overlooked, and so will not be encountered by the average naturalist, but many of the rest are easily caught dipping with a pond net as so many of us did as children. Almost more important than the accurate descriptions is the personally selected fund of information presented as to why each organism is interesting.

I greatly enjoyed reviewing this book, and wish that I had been allowed to keep the review copy, but at least this means that those members of the Society who do not buy it for themselves will be able to read the library copy.

ROGER TIPPETT

The Society wishes to record its gratitude to all those willing volunteers who have given freely of their time and expertise to produce reviews and notices of some 131 books and one audio tape during the last 13 years. Members who would like to join the reviewing panel should contact the Librarian.

EDITOR

Proceedings 1991

The chairman, place* and number present, lecturer's name, title of lecture and note of any exhibits are given for most meetings.

*GMK: Glasgow Art Gallery and Museum, Kelvingrove

UGBD: University of Glasgow, Botany Department

- 8 JANUARY.** Mr E. G. Hancock, GMK, 26.
Mrs Winifred Brown: Nature Section of 22nd Paisley
International Colour Slide Exhibition.
Slides prepared and shown by Mr T. N. Tait.
- 12 FEBRUARY.** Mr E. G. Hancock, GMK, 63. 61st A.G.M.
Activities during 1990 were reported, elections held and
appointments by Council announced (see page 306).
Council reported that at the end of 1990 there were 229 members
(189 Ordinary, 10 Honorary, 4 Junior, 2 School and 24 Family).
Three Council and 2 Executive meetings had been held. There
had been 9 indoor meetings, including the Goodfellow Lecture,
a summer outing, an exhibition meeting and a dinner. There
were 23 excursions.
The A.G.M. was followed by an audiovisual presentation by
Mr T. Norman Tait: The River of Grass.
- 12 MARCH.** Mrs Jean Millar, GMK, 34.
Mr Steven Roderick: The work of the Central Scotland
Countryside Trust.
- 26 MARCH.** Family evening, GMK, 35.
Behind the scenes at the Museum.
- 9 APRIL.** Mr E. G. Hancock, GMK,
Mr David Menzies: Tropical Orchids.
- 14 MAY.** Mr E. G. Hancock, GMK,
Professor Norman R. Grist: Topical Ticks.
Exhibit: Wasp's nest.
Plant and cake sale.
- 11 JUNE.** Social evening in New Lanark.

4 OCTOBER.

Annual Exhibition Meeting, GMK, 50.

Exhibits: Fancy Rats (C. Aitken and A. Wilson); Ticks (Norman R. Grist); 5 Kingdoms Database (R.S.L. Griffith); Teasels (J. M. Millar); Beetles (S. Bolchover); Bird Paintings (M. Lyth); Legumes from Arran and Carmyle (J. Lyth); The Craigmuir Project (E.G. Hancock); Graptolites (R. Sutcliffe).

The following exhibits invited from other societies were also on display: Polished Stones (West of Scotland Lapidary Society); Marine Life (Marine Conservation Society); Freshwater Life (Operation Bright-water); The Canal (Temple Primary School); Glasgow/Fascally Study (Notre Dame Primary); Butterflies (Dowanhill Nursery); Nature table (Dowanhill Primary); Robodog (Whiteinch Primary); Touch Table (Kelvin Unit).

18 OCTOBER.

Book Launch, GMK.

Wild Plants of Glasgow by J. H. Dickson. Originals of paintings by Elspeth Harriman and photographs by T. Norman Tait were on display.

12 NOVEMBER.

Mr E. G. Hancock, GMK.

Dr Graham Durrant: Our Crystal World.

Exhibits: Geological Specimens.

10 DECEMBER.

Annual Dinner, Dining Room of Glasgow University Staff Club, 44.

Followed by show of members' slides arranged by T. Norman Tait.

An exhibition entitled "Christmas Trees and other Conifers", organized by members of the Society, was on display at GMK throughout the Festive Season.

Officers and Council SESSION LXI 1991

- President:* E. Geoffrey Hancock, B.Sc., F.M.A.
- Vice-Presidents:* Mrs Jean M. Millar, M.A., M.I.Biol.
Mrs Elspeth L. S. Lindsay, M.B., Ch.B.,
F.R.C.R.
Ronald M. Dobson, M.A., Ph.D.
- Councillors:* Keith R. L. Cohen, B.Sc., G.I.Biol.
Iain C. McCallum, C.Eng., M.I.C.E., F.I.H.T.
Mrs Edna Stewart, B.Sc.
Iain C. Wilkie B.Sc., Ph.D.
Mrs June P. McKay
Mrs Agnes Walker, B.Sc., M.Sc., Ph.D.
Keith Watson, B.Sc.
Stephen Bolchover
Ms Mary M. Child, B.Sc.
- General Secretary:* Professor Norman R. Grist, B.Sc., M.B., Ch.B.,
F.R.C.P., F.R.C.Path.
- Treasurer:* Robert Gray, B.Sc., M.I.Biol.
- Librarian:* Mrs Ruth H. Dobson, B.Sc. M.Sc.
- Editor:* Ronald M. Dobson
- Conveners of Sections:* Keith Watson (*Botany*)
Richard Sutcliffe (*Geology*)
T. Norman Tait (*Photography*)
E. Geoffrey Hancock (*Zoology*)
- Auditors:* E. L. Sharp, M.A.
E. T. Watt, B.Sc.
- Trustees:* James H. Dickson, B.Sc., M.A., Ph.D., F.L.S.
Peter Macpherson, F.R.C.P., F.R.C.R., D.T.D.C.,
F.L.S.
- Assistant Secretaries:* Keith R. L. Cohen (*Fund-raising and Publicity*)
Richard Sutcliffe (*Membership*)
Mrs A. Craib, M.A. (*Social*)
- Newsletter Editor:* Mrs Lyn Dunachie, B.Ed.
- Editorial Board:* The Editor
Allan McG. Stirling
James H. Dickson
I. C. Wilkie
- Representative:* Mrs Agnes Walker (*Glasgow Urban Wildlife Group*)

The Glasgow Naturalist

This publication is included in the abstracted and indexing coverage of the Biosciences Information Service of *Biological Abstracts* and in that of *CABS* (Current Awareness in Biological Sciences).

The following back numbers are available for purchase at the prices shown (plus postage).

Volume II	(1909-10)	Parts 1, 2, 3, 4	} £1.50 each
Volume III	(1910-11)	Parts 1, 2, 3, 4	
Volume IV	(1911-12)	Parts 1, 2, 3, 4	
Volume V	(1912-13)	Parts 1, 2, 3, 4	
Volume VI	(1913-14)	Parts 1, 2, (3 + 4)	} £1.25 each
Volume VII	(1915)	Parts 1, 2, 3, 4	
Volume VIII	(1916-18)	Parts 1, 2, 3, 4, 5, 6	
Volume XIII	(1937-38)	Parts 1, 2	
Volume XIV	(1940-44)	Parts 1, 2, 3	} £1.00 each
Volume XV	(1945-49)	Parts 1*, 2, 3	
Volume XVI	(1951-52)	Parts 1, 2, (3 + 4)	
Volume XVII	(1952-56)	Parts 1, 2, 3, 4, 5, 6	
Volume XVIII	(1958-71)	Parts 1, 2, 3, 4, 5, 6, 7	} £1.25 each
		Parts 8, 9	
		Part 10	
Volume XIX	(1973-79)	Parts 1, 2, 3, 4	£2.00 each
		Part 5	£2.50
		Part 6	£4.00
Volume XX	(1980-84)	Parts 1, 2, 3, 4, 5	£4.00 each
Volume XXI	(1985-86)	Part 1, 2	£4.00
	(1987-90)	Parts 3, 4, 5	£5.00 each
Volume XXII	(1991)	Part 1	£5.00
	(1992)	Part 2	£6.00

*Part 1 contains (18pp) *The Flora of Easter Dunbartonshire* by J. R. Lee.
 †Part 2 contains (18pp) *Additions to the flora of the Clyde Area* by J. R. Lee.
 §Part 6 (82pp) is a list of the less common Scottish Basidiomycetes by D. A. Reid and P. K. C. Austwick.

Of the earlier journals, the only parts available are:
The Annals of the Andersonian Naturalists' Society:

Volume IV Part 3 £1.00

Proceedings and Transactions of the Natural History Society of Glasgow:

Volume I	(1885-86)	Part 3	} £1.50 each
Volume II	(1886-88)	Parts 1, 2	
Volume VI	(1899-1901)	Parts 1, 2	
Volume VII	(1904-05)	Part 3	
Volume VIII	(1905-08)	Parts 1, 2	

Orders for any of the above and for copies of the current and future issues, or for reprints or photocopies should be addressed to *The Librarian*:—

Mrs R. H. DOBSON,
 7 NETHERBURN AVENUE,
 GLASGOW, G44 3UF.

Contents

Page

- 205 Some Observations on the Effects of Mineral Solids Deposition on Littoral Invertebrates in Loch Lomond, C. R. DOUGHTY.
- 213 Colour Plates in The Glasgow Naturalist.
- 214 Obituary: ELSIE CONWAY, B.Sc., Ph.D.
- 215 Additions to the Coleopteran Fauna of Colonsay and Oronsay, Argyllshire (South Ebudes, V.C. 102), D. C. JARDINE, J. CLARKE and P. M. CLARKE.
- 218 Book review: Freshwater Fishes of the British Isles, P. S. MAITLAND and R. N. CAMPBELL.
- 219 Some Recent Records of Bird's-nest Orchid in the Clyde Valley, A. G. WALKER.
- 221 The Distribution of Amphibians in Central Region, Scotland, O. L. LASSIÈRE.
- 239 Cotoneaster Update, P. MACPHERSON and E. L. S. LINDSAY.
- 243 First Records of the Striped Dolphin, *Stenella coeruleoalba* in Scottish Waters, R. J. REID, A. KITCHENER, H. M. ROSS and J. HERMAN.
- 246 Book Reviews: The Soil, B. DAVIS, N. WALKER, D. BALL and A. FITTER; Flitting the Flakes, M. PEARSON (Ed.).
- 247 Records of Lepidoptera on North Uist, Outer Hebrides, K. P. BLAND.
- 251 Insect Records from the West of Scotland in 1991 and Some Records for Coleoptera for 1990, E. G. HANCOCK (Comp.).
- 254 Book Review: The Trials of Life, D. ATTENBOROUGH.
- 255 The Natural History of the Muck Islands, North Ebudes 9. Insecta: Neuroptera, Trichoptera, Siphonaptera and Hymenoptera — Symphyta and Aculeata, R. M. DOBSON.
- 259 David Ure (1749-1798) — 'Breadth of Mind and Accuracy of Observation', J. H. BURNS.
- 275 Book Review: Collins Photoguide to Fossils: H. MAYR.
- 276 Book Review: Geological Excursions around Glasgow and Girvan, J. D. LAWSON and D. S. WEEDON.
- 277 Short Notes, compiled by A. McG. STIRLING.
- 293 Book Reviews: List of Vascular Plants of the British Isles, D.H. KENT; Checklist of the Plants of Perthshire, R.A.H. SMITH, N.F. STEWART, N.W. TAYLOR and R.E. THOMAS; New Flora of the British Isles, C.A. STACE. A Field Guide to the Rare Birds of Britain and Europe, I. LEWINGTON, P. ALSTROM and P. COLSTON: Endangered Birds, J. FERGUSON-LEES and E. FAULL; Newmann's Birds of Southern Africa 1991 Update, K. NEWMAN; In Search of Arctic Birds, R. VAUGHAN; The Cambridge Encyclopedia of Ornithology; M. BROOKE and T. BIRKHEAD (Eds.); The Birds of Fair Isle, J. N. DYMOND; Leopard, G. HINDE: The Illustrated Encyclopaedia of Shells, K.R. WYE; Spiders: an Illustrated Guide, R. PRESTON-MAFHAM; The Hemiptera or True Bugs, W.R. DOLLING; A Field Guide to the Wildlife of the Falkland Islands and South Georgia, I.J. STRANGE: The Forth Naturalist and Historian Vol. 15; Watching Wildlife — a Field Guide to the Wildlife Habitats of Britain, G. YOUNG and E. FRANKS; The Great Wood of Caledon, H. MILES and B. JACKSON; The Good Zoo Guide, J. IRONMONGER; A Natural History of the Lakes, Tarns and Streams of the English Lake District, G. FRYER, ill. by S. MURPHY.
- 304 Proceedings 1991.
- 306 Officers and Council, SESSION LXI, 1991.

GH
1
G5X
N17

SMITHSONIAN
APR 18 1994

The Glasgow Naturalist



Leaves of roses characteristically
damaged by Leaf-cutter bees.

Volume 22

Part 4
1994



The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow or the Glasgow Art Gallery and Museum.

The present rates of subscription per annum are: for Ordinary Members, £10. (£9 if paid before the A.G.M.); Family Members, £2 extra; Junior Members (under 21), £5; School Members, £1. Payment by Direct Debit is encouraged. Further information regarding the Society's activities and membership application forms are obtainable from the *General Secretary*:

C/O NATURAL HISTORY DEPARTMENT,
MUSEUM & ART GALLERY,
KELVINGROVE,
GLASGOW, G3 8AG.

The Glasgow Naturalist

Published by the Glasgow Natural History Society
ISSN 0373-241X

February 1994
Price £6.00

Edited by R. M. Dobson with the assistance of J. H. Dickson, R. H. Dobson, A. McG. Stirling, I. C. Wilkie and T. N. Tait.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is printed on the inside back cover.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. The nomenclature of vascular plants should be as in Stace, C. A. 1991. *The New Flora of the British Isles*. Oxford University Press.

All communications on editorial matters should be sent to:

Dr R. M. DOBSON,
ZOOLOGY DEPARTMENT,
UNIVERSITY OF GLASGOW,
GLASGOW G12 8QQ.

A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

The Flora of Ailsa Craig

BERNARD ZONFRILLO

Zoology Dept., University of Glasgow, Glasgow,
G12 8QQ.

Isolated islands have a fascination for naturalists which is easy to understand. Their boundaries are well defined and the influences affecting them are much more obvious than on the more extensive areas of mainland. They are to a great extent self-contained. Ailsa Craig, lying at the entrance to the Firth of Clyde and around 15 kms (10 miles) from the Ayrshire coast, is just such a place. (Plate 2a, Maps 1 & 2). The island is, geologically, an igneous intrusion rising to 340 metres above sea level, composed of an unique granite intersected by dykes and seams of dolerite, and is radiometrically dated at 61 million years old, (Harrison et al. 1987) . The few non-granitic rocks on the island are the product of glacial action from the last Ice-age, some 20,000 years ago. Since that period, the colonisation of the island by plants, birds, mammals, reptiles and insects has produced a flora and fauna of great scientific interest.

At present Ailsa Craig is designated a Site of Special Scientific Interest under British legislation and a Special Protection Area under European Community Directives.

Botanical History

Ailsa and its flora have been the subject of study and comment for over 200 years, the first few botanical notes dating from the visit of John Lightfoot in 1772. Between then and the present day, the flora of Ailsa Craig has featured in the literature in a range of papers and notes, the earliest checklist being compiled by Professor J.H. Balfour in 1844 (Balfour, 1845). This list was later reprinted, with minor corrections, in Lawson (1895). Balfour was the leading Scottish botanist of his time, and he, with a group of students visited "Ailsa Crag" on 27 July 1844. An eventful trip which took seven hours to make landfall, having set sail from Maidens on the Ayrshire coast, at 4 a.m., soon to be becalmed. Plants were collected along the route to

and from Ailsa, and this perhaps explains the occurrence of some species incorporated onto the list which have never been seen since. But a list was published and this effectively set the foundation for future visiting botanists to build upon.



Map 1. Map showing location of Ailsa Craig.

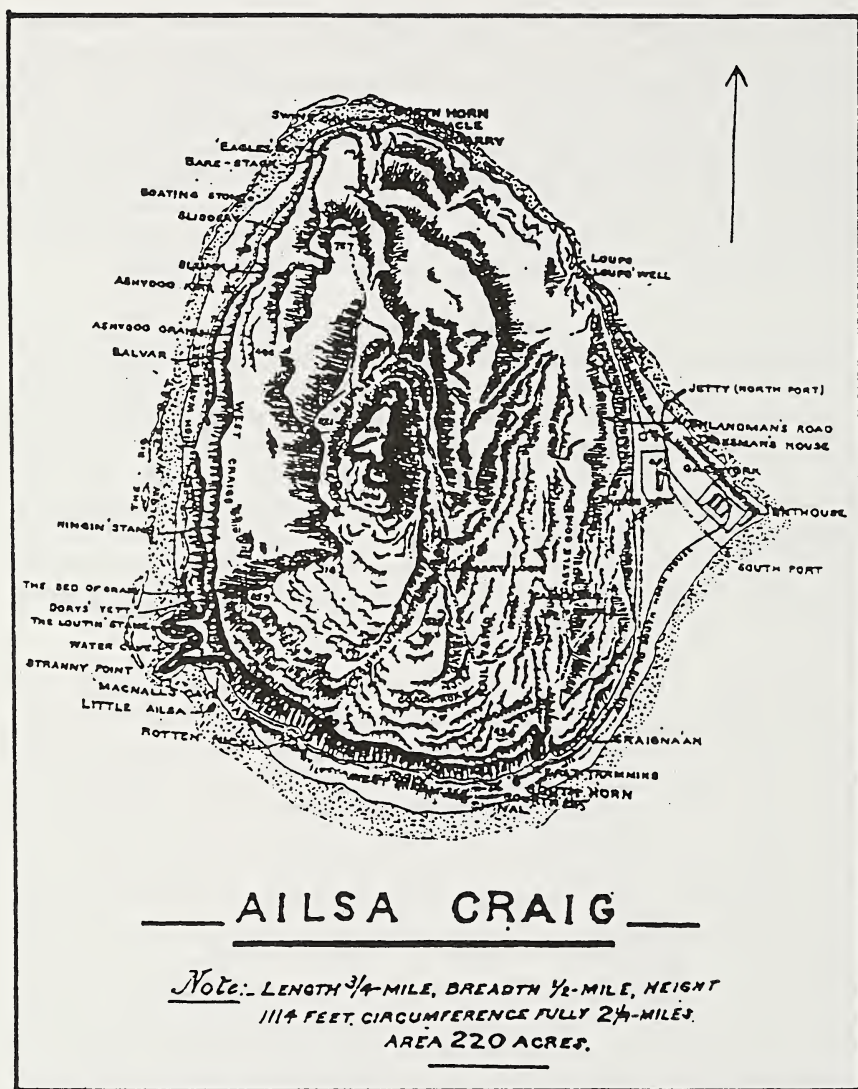
With the advent of organised natural history societies and the popularisation of natural history in the late Victorian era, it was predictable that Ailsa should fall under the inquiring minds of our forebears. An account of Ailsa's natural history by Andersonian naturalists, Smith, Patterson & Watt (1900), claimed to be the final

word on what was known of the island. This contained the second main botanical list which was compiled by John Smith from two day visits, the first on 3 June 1893 and the second on 24 May 1900. The first trip by Smith had been written up as a travelogue in a local Ayrshire newspaper, which thankfully included an appended list of plants. Such historical records are of great importance and are a valuable aid to monitoring the long-term changes in island floras. Smith's list was a fresh account of the island's botany. These papers then took botanical recording on Ailsa into the present century.

Many of the subsequent published lists were simply re-compilations or derivatives of the papers by Balfour and Smith *et al.* It was not until the publication of J.R. Lee's *The Flora of the Clyde Area* (1933), that previous records were criticised and questioned. In 1922, G.M. Vevers made a list of plants, several of which were new. The list was unpublished but later incorporated into the checklist given by his brother, H.G. Vevers, in his 1936 paper on the *Land Vegetation of Ailsa Craig*. Lee's *Flora* was consulted in the production of the list, as were the previous published lists. Vevers (1948) also published a more general account of the island's natural history, having spent several seasons visiting Ailsa.

With the proposed *Atlas of the British Flora* in 1962, the Andersonian Naturalists of Glasgow were determined to make sure Ailsa was not neglected and organised two one-day visits in June 1958. This produced recording cards listing 104 species of plants and ferns, 17 of which had not appeared on previous lists. Duplicates of the original cards by some of the team of botanists who visited the island have been consulted in the preparation of this paper. It is unfortunate that while recording cards tell whether a plant was present on the day of the visit or simply was not recorded, they give no indication of abundance. Cards by visiting botanists such as J.T. Swarbrick & J. Llewellyn-Jones in 1964 have included new records and perhaps dubious records with no way of confirming either. These two visitors claimed no fewer than 22 new records for the island on a single visit! Only eight of these have subsequently been found to be present, so the remainder have been demarcated as dubious in the species accounts given below. Errors can simply occur by crossing off the wrong name on the list.

Ten years after the *Atlas* was published, John Mitchell (1972) drew together all the plant records from Ailsa under the title *Two Centuries of Botanical Recording on Ailsa Craig*, giving not only a



Map 2. Map of Ailsa Craig first published in 1895 in Lawson.

checklist of plants but a potted history of the botanists and botany since Lightfoot's first notes of 1772. Mitchell's list was a compilation of virtually all the species mentioned in previous publications and included recently confirmed records as well as species awaiting confirmation. Unfortunately the list did not denote status in any way

and only a few species were discussed in the text. However this work was comprehensive and was regarded as the definitive list of Ailsa plants for botanical visitors.

Since the 1972 list, the botany of Ailsa Craig has received little attention. A few notes on species claimed to be new to the island have been published and the only scientific examination of Ailsa's botanical past has been attempted by pollen analysis (Paton, 1976).

The Present Work.

As a regular visitor to Ailsa since the 1960s, mainly in the study of seabirds, the writer obtained lease of South Cottage from the island's owner, the Marquess of Ailsa, in 1982, establishing a semi-permanent base for further research and study.

With the decommissioning and automation of the lighthouse on Ailsa, which had been built in 1883, the permanent human influences on the island ceased on the last day of March 1990. The consequences of the human habitation of Ailsa Craig on the island's botany are discussed later. From the early 1980s the botany of Ailsa drew comment amongst those who had visited the island, as much for the species not present as for those which were. Two factors were obvious from the previous published works :

- (A) There was no comprehensive collection of Ailsa Craig plants in existence for consultation or reference, despite many visits by many botanists over the years ; and,
- (B) Few botanists had spent more than a couple of days in total actually on Ailsa Craig.

Correspondence with curators of the main botanical collections in Scotland showed that few specimens from the island were retained for posterity. The stated collections by Balfour, for example, appear no longer to exist, and the extensive collection of plants in the Herbarium at Glasgow University contained but 6 plant specimens from Ailsa, all collected around the early years of this century.

It was therefore a priority to collect a specimen record of each species for reference and posterity. This has now been completed and the collection duly housed in the Botany Department at Glasgow University. The notes on status and distribution are given as a basis for further research in future years and to aid monitoring of vegetational changes. The list of species recorded continues to grow

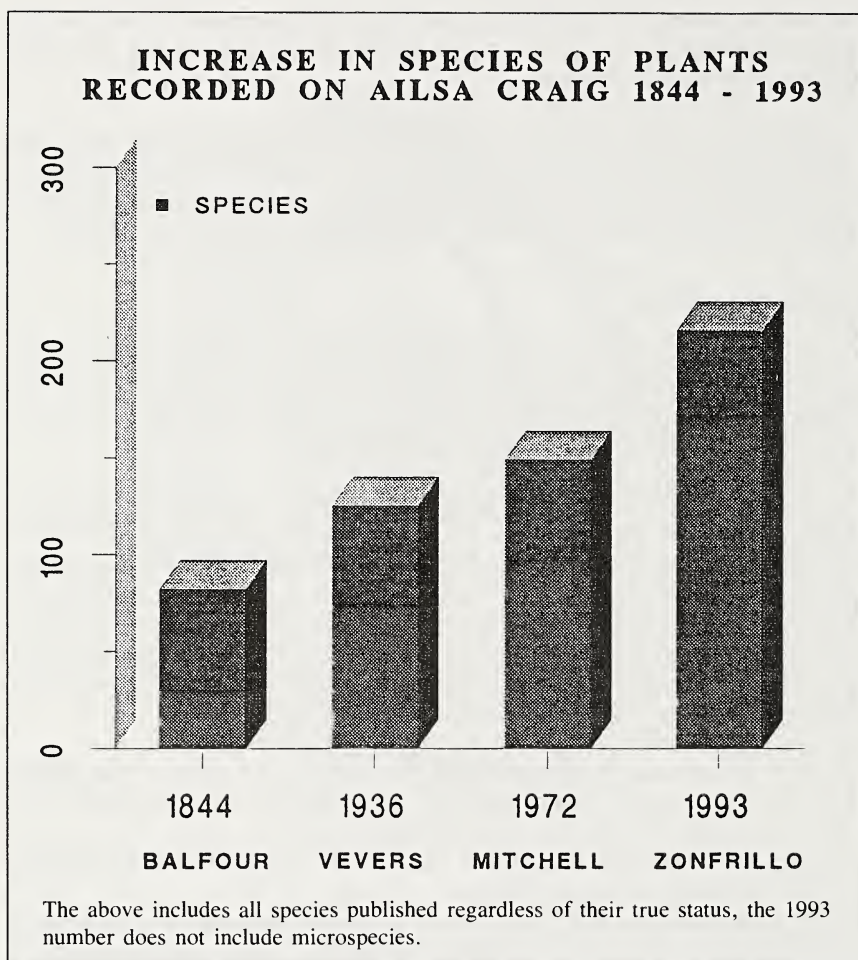


Figure 1. Increase in plant species recorded on Ailsa Craig since 1844.

(Fig. 1). All correspondence with regard to the compilation of this paper has been deposited for safe keeping with the Marquess of Ailsa.

Previous Records and the Likelihood of Occurrence

From the literature, it is obvious that some previously published records are distinctly dubious. Without a reference specimen for confirmation, problems arise when trying to assess status or even likelihood of a species occurring, not only in the past but also in

modern times.

All dubious records have been examined thoroughly and conclusions drawn from a good knowledge of the island, its micro-habitats, substrates and past activities. Some species, recorded in the past and now apparently absent, are more likely than others. Those with airborne seeds are perhaps likely candidates for making landfall from elsewhere, as also are plants whose seeds float, and may be washed and blown ashore from the sea. On land, the species which are not eaten by rats and rabbits are more likely to survive than those which are. Seeds may also be brought to the island by birds - in the form of pellet regurgitations and droppings or by adhering to the feet or plumage of the bird only to be preened off later.

Ringling has shown that birds visit Ailsa from as far north as Greenland (Wheatear) and as far south as southern (Storm Petrel, Swallow) or equatorial (Gannet, warblers etc) Africa. It is not outwith the bounds of credibility that seeds may arrive and germinate by such agency.

Casual species, usually annuals, may come and go depending on their reproduction processes, indeed in the course of the last ten years some species have done just that. Some casuals have clearly been associated with cultivation on the island. Assessing such events from past records has been a major problem in producing a definitive list. It is patently obvious that in some cases a straightforward misidentification of a rare species for a common one and *vice versa* has occurred. These usually show when a botanist has recorded one but not the other of two somewhat superficially similar species.

Ailsa has some unusual species but lacks many common ones. The fact that not one species of Cyperaceae has been recorded on the island, will astonish many botanists, since sedges are among the most abundant and successful plants in Britain. This anomaly alone deserves further, more detailed, investigation. It is notable that no Cyperaceae pollen was recorded from the island in the core samples analysed by Paton (1976).

Factors Influencing the Present Flora of Ailsa Craig

Aspect, temperature, substrate, wind and rainfall all play their part in governing the growth and persistence of plants on islands. These are natural phenomena and apply to all species everywhere. The mild

winters on the island means that the flowering periods of plants given in most floras are inaccurate as far as Ailsa is concerned. A mid-December visit found several of the following plants still producing flowers - Sea Radish, Red Campion, Sea Campion, Common Field-speedwell, Common Ragwort, Prickly Sow-thistle and Cat's-ear, all defying the published literature. The major influence on the vegetation of Ailsa has been through the agency of man. Accidentally or deliberately introduced herbivorous animals, mainly rodents and rabbits modify and dictate, to a large extent, which species of plant dominate and proliferate on any island. Both Rats and Rabbits are alien to Britain, although now naturalised all too successfully. Ailsa was known as a place of Rabbits from the literature by William Abercrummie, *Carrick in 1696*. It was common practice for mediaeval fishermen to introduce Rabbits to remote islands as a security against starvation if wrecked or stranded during periods of bad weather. Rabbits, therefore, had long been an influence on the vegetation of Ailsa, as they have been on other islands. Rats arrived on Ailsa also through the agency of man by means of a shipwreck in 1889. A boat carrying coal to the recently opened lighthouse foundered in bad weather and from then on Rats gained a foothold, destroying much of the bird populations in the process (Campbell, 1892). Other shipwrecks - and there were several since that time, may have added to their numbers. In 1990 a determined effort was instigated to rid the island of Rats. Poisoning during the spring of 1991 and 1992 has resulted in the island being probably Rat-free for the first time in over 100 years. Time will determine whether this has indeed been a complete success. In the process of eliminating Rats, Rabbit numbers were also greatly reduced. This reduction has already resulted in profound changes in the vegetation. A complete eradication of Rabbits would be highly beneficial to the flora of Ailsa Craig and would go a long way to restoring the island to its original condition. From being formerly closely cropped, the vegetation has shown a remarkable resurgence (Plate 1). One immediate response was that plants grew more luxuriantly and larger than ever before, freed from the constant surface cropping which perhaps resulted in an overdeveloped rootstock. Such plants attained more normal proportions in successive years.

Ailsa, at one time, had a small community of about 30 people, comprising crofters, granite workers and lighthouse keepers, all of whom ate Rabbit. Such controls on the Rabbit population slowly vanished, as traditional ways died out, allowing their numbers to multiply profusely, until recently. Rabbits also create soil erosion and

Plate 1

**View of the winch-house and lighthouse area, 1st Aug. 1990,
*before the elimination of rabbits and rats.***



**After mammalian grazing pressure was halted, 1st Aug. 1993.
*Note the rapid recovery of the vegetation.***

large areas of upper gulleys occasionally landslip on to the shores. In some places soil erosion is so bad that the bedrock has been reached and will take decades to replace. The boardwalk and parapet to the north foghorn was badly damaged by just such a landslip precipitated by Rabbits in 1985.

In this and the last century, Goats and Sheep were also commonly kept by the islanders, the Goats mainly for their milk. Their effects on the vegetation must have been catastrophic for many plant species. Goats were regularly reared and culled until the 1950s, when human activity on the island dwindled. Following the evacuation of St Kilda in late August 1930, 20 Soay Sheep were taken from there and released on Ailsa. After many years, during which their numbers were controlled, they were subsequently removed sometime before 1961. Thankfully the vertical cliffs of Ailsa had ledges which even these sure-footed animals could not reach. The vegetated ledges were basically sustaining relict populations of plants which no doubt were formerly more abundant. The ledges acted as "seed banks" and the regeneration of the island at present owes much to their persistence.

The effects of the introduced mammal species helps explain the present rankness of vegetation in many places, with Bracken, Elder etc. gaining an advantage over more palatable species. After such a long period of human based influence, it would be a worthwhile exercise to monitor accurately and scientifically the vegetational changes which would occur following the complete eradication of Rabbits. The earthy ridges on the upper parts of Ailsa, particularly around the Castle area, may have been cultivated in the distant past. The lower walled areas belonging to the Lighthouse Board were cultivated until 1989. However there are few "escapes" from cultivation which have established themselves on Ailsa Craig. In ancient times it is clear that the vegetation then differed little from that now present, with a few exceptions. Paton (1976) found a peak of *Salix* pollen at 3.10 metres and also at the same depth found fragments of *Salix* wood. The species was unidentifiable. Aspens still occur, albeit in a dwarf form, and it would seem likely that some type of similarly dwarfed Willows covered much of the earthy ridges and rills. While these have disappeared either naturally or by the effects of grazing animals, the Bluebells which probably flourished beneath their shade have persisted and indeed still grow in profusion (Dickson, 1991), providing a spring spectacular over much of the east side of the island. Alder, *Alnus glutinosa*, might also have been native to Ailsa in the distant past. Another species, now no longer present

but recorded by Paton in the core samples, was *Equisetum fluviatile*, perhaps due to the Garry Loch area being more permanently wet than at present. Three layers of carbonised fragments are present in the sediment showing evidence of fire. Paton dismissed the likelihood of natural fires occurring but these seem very likely to me. At least three lightning strikes have taken place within the past five years, and the former detached granite column at the south of the island called "Rotten Nick" was probably demolished during just such a lightning storm in March 1952 (Gibson, 1952). While most lightning strikes happen in wet weather, a summer drought followed by a "dry" strike could easily set much of the turf ablaze.

The List

In correspondence with J. Mitchell during the preparation of his 1972 paper, the late R. McKechnie summed up the dilemma involved in admitting unsubstantiated plant records from casual visitors by stating that "... it is never safe to say something *couldn't* occur in a location that hasn't been minutely examined". With the caveat that nothing is impossible, decisions have to be made regarding in particular, old, unsubstantiated records. With no extensive specimen collection existing of Ailsa Craig plants from the past, conclusions and decisions in essence must be derived from what is now known. The island has now been examined in a fair degree of detail, and past records no longer located have been abstracted only after careful consideration.

Errors in compiling lists can occur by many means. To this end I have denoted three categories of records:

- (1) Specimen records, denoted by an asterisk, thus, *.
- (2) Records which in my opinion have been reliably identified but are not supported by a specimen, denoted thus, +.
- (3) Records which have no specimen to allow verification and which I consider to have been either misidentified or otherwise confused, or are highly unlikely, given present knowledge and experience of the island's flora. These are denoted thus, #.

The reasons for rejecting records are given under the appropriate species.

Ailsa Craig will continue to accrue new records, and perhaps some species will vanish, in the course of time. Some of the records which I have doubted may find their way back onto the Ailsa flora. I

will be delighted if proven wrong in my judgment. Before the advent of man on Ailsa Craig the flora would have perhaps been more generally diverse. Studies of pollen from cores taken at other areas of the island might reveal notable differences, particularly around the basal areas. In time many shore-loving plants might establish themselves on Ailsa and others present may die out. A revision of this paper before the middle of next century might prove my point, particularly if Rabbits can be eliminated.

This flora is intended to aid plant finding and recording on Ailsa. I can only reiterate the words of J. R. Lee in *The Flora of the Clyde Area* who said of the Ailsa Craig records - "... It is hoped that this will enable botanists visiting the Craig to ascertain with ease whether any plants observed by them have or have not been previously noticed, and so facilitate further additions to our knowledge of its flora." I advise anyone finding a species new to the island or a re-discovery of any reputed plants, to collect a small or diagnostic part of the plant (provided it is not a protected species), or to take a photograph good enough for positive identification. I also urge publication of such new or rediscovered records so that future researchers have a relatively straightforward task. Similarly, interesting records from other small islands both on the Clyde and elsewhere should find their way into the literature. Such records, even from casual visits, are the essence of island floristics.

The ferns have been revised since the publication of my paper (Zonfrillo, 1991) to incorporate the most up to date knowledge of their distribution. Systematics and nomenclature follow that of Stace (1991). Place names on Ailsa are largely based on the map in Lawson (1895), which contains the original spellings and locations. More recent maps have anglicised spellings and, in some cases, locations are incorrect.

The List comprises a grand total of 210 flowering plants and 13 ferns recorded from Ailsa Craig, of which 47 flowering plants and 1 fern are considered of dubious occurrence.

Status and Distribution of Flowering Plants and Ferns on Ailsa Craig

* = specimen in herbarium of Glasgow University Botany Dept.

+ = reliably recorded but no specimen collected,

= no specimen found - confirmation required, record considered dubious.

FERNS - PTEROPSIDA

POLYPODIACEAE

Polypodium vulgare * (Polypody)

Found distributed over the east slopes and in the Loups Caves, but not very common.

Polypodium vulgare x interjectum = *mantoniae* * (Hybrid Polypody)

Frequent on the east slopes sometimes growing vigorously and large. This hybrid appears to be relatively well established.

Polypodium interjectum * (Intermediate Polypody)

Found over much of the east side of the island, on cliffs and on the level ground amongst the Heather by the Gasometers. It is fairly common where it occurs.

DENNSTAEDTIACEAE

Pteridium aquilinum * (Bracken)

Bracken occurs abundantly on Ailsa, from the basal area at Blue Hone Quarry in the north to the area around the South Foghorn and near to the summit.

ASPLENIACEAE

Phyllitis scolopendrium * (Hart's-tongue)

Found mainly on man-made structures associated with the building of the Lighthouse. It is present in good numbers on the side-ports of the old iron Gasometers. Also found at Loups Caves and at Dalton's Cove, but not in as big a form as at the Gasometers.

Asplenium adiantum-nigrum * (Black Spleenwort)

This is perhaps the scarcest fern on Ailsa. It is found on the ruins of the Castle at 120 metres above sea level, and beside the Castle path.

Asplenium marinum * (Sea Spleenwort)

A cave and crack-dwelling fern of the south and north-east aspects of Ailsa. At McNall's cave it grows robustly, manured by the guano washings from the Gannets breeding above, and grows to over 350 mm in length. It is also found at Loups Caves and at Swine Cave.

Asplenium trichomanes * (Maidenhair Spleenwort)

A very obvious and common species associated with the walls and structures of the Lighthouse enclosures. It is found growing from natural rock along the ridge from South Cottage to Craignaon, but is scarce in such situations. Near the Lighthouse it grows on the ground.

Asplenium ruta-muraria * (Wall-rue)

Present in small quantity, mainly on the south-facing perimeter granite wall

enclosing the Gasometers. A few plants also grow on the inner walls of the ruined Smiddy building and on the brick walls of the Gashouse building.

Asplenium septentrionale # (Forked Spleenwort)

A Swarbrick & Llewellyn-Jones card-listed record from 1964. An uncommon plant and very unlikely for Ailsa Craig.

WOODSIACEAE

Athyrium filix-femina * (Lady-fern)

Found mainly at low levels, in the area of the Gasometers, on the vegetated slopes at Loups Caves, where it grows in profusion, and on some of the upper ridges to around 200 m.

DRYOPTERIDACEAE

Dryopteris affinis * (Scaly Male-fern)

All specimens of "Male-fern" from Ailsa have proved to be only of the Scaly Male-fern. It grows commonly in small tufts around the basal screes and on the more broken upper parts of the island. It is an obvious light fern amongst the other darker green vegetation.

Dryopteris dilatata * (Broad Buckler-fern)

Fairly frequent on the man-made structures at the Gasometers and in most damp caves. It is also found at seepage areas at Craignaon and elsewhere.

FLOWERING PLANTS - MAGNOLIOPSIDA.

RANUNCULACEAE

Caltha palustris * (Marsh-marigold)

Known since Balfour's visit of 1844, from the Garry Loch area, where it still grows. It is also abundant at the burn running out from the ridge north-east of Garry Loch, and occurs nowhere else on the island. Flowers appear in early April.

Ranunculus acris * (Meadow Buttercup)

Grows in a few damp places, mainly at Red Gair and other trickles around the north east of the island. Occasional isolated plants can appear around the island and on the upper slopes.

Ranunculus repens * (Creeping Buttercup)

Common around the buildings and in the former garden areas and beside the Castle. There are also some patches around the old compressed air cylinders beside the South Foghorn.

Ranunculus bulbosus # (Bulbous Buttercup)

I have not recorded this species on Ailsa. It was first listed by Smith *et al.* (1900) who did not list *R. acris*. I feel this species was misidentified and so should not be regarded as part of the Ailsa plant community. The typical habitat conditions are not present on Ailsa.

Ranunculus flammula * (Lesser Spearwort)

Listed by all the former compilers, this species no longer occurs. The site was at

Garry Loch and there are specimens collected in the early years of this century by Boyle, now in the herbarium at Glasgow University Botany Department. It probably persisted into the mid-1970s, finally to be exterminated by Rabbits or Rats. It may make a re-appearance now that these mammals have been controlled.

PAPAVERACEAE

Papaver dubium * (Long-headed Poppy)

I have twice recorded this species, the first in 1984 (Zonfrillo, 1990) and another in 1991, both near the Gashouse building.

FUMARIACEAE

Ceratocapnos claviculata # (Climbing Corydalis)

This species was first listed by Smith during his first Ailsa visit, in 1893. He did not list the next species, *F. capreolata*, then, but recorded it on his second trip. I feel that this species has been confused with *F. capreolata*, both in the past and more recently. R.C.L. Howitt (1976) recorded this species as “near the base of the south cliffs” exactly where *F. capreolata* still grows in abundance. Howitt did not record *F. capreolata* on his botanical recording card, a species difficult to miss. Despite many hours searching, at different times of the year, I have been unable to locate a single plant.

Fumaria capreolata * (White Ramping-fumitory)

A nationally rare species (Stace, 1991), which grows mainly around the south side of the island (Plate 2b). Abundant under the Rotten Nick area, and on the cliffs above, where it climbs and twists around the stems of other bushy species such as Elder and Tree Mallow. It also grows under the Ashydoo cliffs on the west side. It flowers early in the year, around March and then has a second “flush” in August. The later vegetation appears much more robust than the spring growth.

URTICACEAE

Urtica dioica * (Common Nettle)

Very common, and a major source of food for the caterpillars of Small Tortoiseshell butterflies. The stings are particularly painful (Lawson,1895).

Urtica urens * (Small Nettle)

Grows mainly under the bird cliffs, at the Trammins, near McNall’s Cave and below the west cliffs in a few places.

Soleirolia soleirolii * (Mind-your-own-business)

This species grows only at the foot of the wall around and within the main gate to the Lighthouse, and was first noted as a well-established patch in 1990. It may have been bird-borne or introduced through garden material.

CHENOPODIACEAE

Chenopodium album # (Fat-hen)

Unrecorded by me and, I feel, dubiously recorded by Vevers (1936). This plant may have been confused with specimens of the next species, *A. glabriuscula*, which is a very variable plant on Ailsa.

Atriplex glabriuscula * (Babington’s Orache)

Common under the bird cliffs at the south and west. Elsewhere on the island it is

sporadic. It is a variable plant, some specimens tough and leafy, others thin and sparse. Some specimens collected by Dr. J.H. Dickson in 1983 may be hybrids with Common Orache.

Atriplex littoralis # (Grass-leaved Orache)

A species which may have been confused with the next species *A. patula*. I have failed to find it, despite careful searching in the places where it was said to have occurred.

Atriplex patula * (Common Orache)

Common on the east and south sides of the island. More scattered and scarce elsewhere.

Beta vulgaris ssp. *maritima* # (Sea Beet)

Recorded by Howitt (1976) but perhaps confused with other species or with hybrids of *Atriplex*.

PORTULACACEAE

Montia fontana * (Blinks)

Associated with the few places of standing water on Ailsa, namely at Garry Loch and Castle Well. It is also found at the edges of the Red Gair burn.

CARYOPHYLLACEAE

Arenaria balearica * (Mossy Sandwort)

Found only at the foot of the south wall of the Lighthouse enclosure. This spring plant may have been introduced with materials delivered to the Lighthouse or, given its position under the wall, may have been introduced by birds. It has survived well and the species in general has for many years now been found naturalised in Kintyre and mainland Ayrshire (Lee 1953).

Honckenya peploides # (Sea Sandwort)

Listed by Vevers (1936) but not found by me and, although common enough on the Ayrshire coast, I remain to be convinced of its occurrence on Ailsa Craig. Ailsa has none of the sandy ground upon which this species thrives.

Stellaria media * (Common Chickweed)

Very common on moist shaded areas where it grows robustly. It is common near the caves and under the bird cliffs.

Stellaria holostea # (Greater Stitchwort)

A card-listed record by Swarbrick & Llewellyn-Jones from 1964. One of several plants not subsequently located.

Cerastium fontanum * (Common Mouse-ear)

Common on the east side of the island around the buildings. It is also found on the south side, on the pebble beach and path, and as high as the summit.

Cerastium diffusum * (Sea Mouse-ear)

Recorded first in 1958 (Mackechnie & Ribbons, 1973). It grows on the moss-covered rocks below the Castle and also along the pathways.

Sagina procumbens * (Procumbent Pearlwort)

Very common around the basal part of the island, particularly on the east side.

Sagina apetala * (Annual Pearlwort)

A Swarbrick & Llewellyn-Jones card-listed record found in 1964, now only on a small gravel patch at the former Jetty. Perhaps fewer than 10 plants exist at present

Sagina maritima * (Sea Pearlwort)

I have been able to find only a few specimens of this species on Ailsa, at the North Foghorn. Those found were on rocks among moss. It was previously recorded by Balfour (1845), at the south of the island, but is at present apparently very scarce.

Spergularia rupicola * (Rock Sea-spurrey)

Grows commonly on rocks, walls and cliffs with a fine display concentrated on the slopes below the West Trammins just above the shore. In various habitats and substrates it takes different forms. Those on shore rocks and small cliffy crevices often grow long and straggly. Those plants growing on ledges or earthy banks are more typical of the species in general. The *Spergularia* spp. questioned by Lee (1933) probably all refer to this species.

Spergularia media # (Greater Sea-spurrey)

Listed by Balfour (1845) but probably confused with *S. rupicola*, which was not recorded.

Spergularia marina # (Lesser Sea-spurrey)

Mentioned by old accounts and questioned by Lee (1933). Probably confused with *S. rupicola*.

Spergularia rubra (*) (Sand Spurrey)

There is an old specimen record of this species from 1892 in the Dept. of Botany at Cambridge University , but it has never been seen since. It must surely still exist on Ailsa.

Silene vulgaris # (Bladder Campion)

Card-listed by Swarbrick & Llewellyn-Jones in 1964, with no subsequent identification.

Silene uniflora * (Sea Campion)

An abundant and showy plant on Ailsa Craig. It grows over much of the island, sometimes forming dense mats, as at the top of the west cliffs. Here it is gathered by the Gannets as nesting material, large groups of hundreds often cropping extensive patches, which are conspicuous when viewed from a boat. Both this and the next species flower during winter.

Silene dioica * (Red Campion)

For many years a feature of Ailsa. Smith (1893) found it gracing the east slopes, where it is still in abundance. It also grows near to the summit as well as under the bird cliffs. The Ailsa plants are very robust and hairy, and these features persist in cultivation. Dr. J.H. Dickson collected seeds in 1983 and the plants subsequently grown in his garden have retained their distinctiveness. A white-flowered form grows at the north-east of the island.

POLYGONACEAE

Persicaria maculosa * (Redshank)

Noted on the record cards of J.T.Swarbrick and J. Llewellyn-Jones in 1964, this species had not been recorded since then, until one small plant was found at the Gashouse in 1991.

Polygonum aviculare * (Knotgrass)

A few plants recorded from the walled areas at the Gashouse in 1991 showed that this species has persisted even although gardening had ceased on the island for many years.

Rheum x hybridum + (Rhubarb)

This species was fairly uncommon before the control of Rabbits. It grows vigorously in damp summers but in drought periods, as in 1992, hardly appeared above the surface.

Rumex acetosella * (Sheep's Sorrel)

This species was fairly uncommon before the control of Rabbits. It was usually found in a dwarf form in one or two locations. In the absence of Rabbits it grows well and has spread to several areas mainly on the south and east sides, and to an altitude of around 1000 feet.

Rumex acetosa * (Common Sorrel)

The slopes below the south and west cliffs and in and around all the caves have rank growths of Common Sorrel. It is abundant and in a large form.

Rumex crispus * (Curled Dock)

The commonest Dock on the island. It grows around most of the basal scree areas, with particularly notable stands beneath Main Craig. The roots are much sought after by Rabbits in winter.

Rumex obtusifolius * (Broad-leaved Dock)

A very scarce species on Ailsa. It can be found in the former garden areas but most plants now appear to have perhaps hybridised with *R. crispus*.

PLUMBAGINACEAE

Armeria maritima * (Thrift)

Grows commonly on the south and east sides of the island. It is heavily grazed by Rabbits when they are abundant. Some large decorative clumps grow from the cliffs at Dalton's Cove and at the Loups Caves. In such situations the clumps appear to have a single rootstalk and must be very old.

CLUSIACEAE

Hypericum pulchrum * (Slender St John's Wort)

Found in 1992 growing on a high grassy slope above the North Foghorn. About ten plants survive, although Rabbits frequently graze this area.

MALVACEAE

Lavatera arborea * (Tree-mallow)

This nationally rare species (Stace, 1991) is probably at its most northerly native European station on Ailsa. Known from Balfour's visit in 1844 as being restricted to the south cliffs at the Trammins. The main centre is situated on the grassy ledges at



a. South-west aspect of Ailsa Craig



b. White Ramping-fumitory
(*Fumaria capreolata*)



c. Tree Mallow
(*Lavatera arborea*)



a. Aspen
(populus tremula)



b. Slender Thistle
(Carduus tenuiflorus)



c. The area known as Rotten Nick showing the southern cliffs where Tree Mallow and Sea Radish grow.

Rotten Nick (Plate 3c), where it has eluded the ravages of Goats and Sheep, and even Rabbits (Plate 2c). Mackechnie & Ribbons (1973) found it "in considerable quantity" in 1958. By 1970 it was down to only 3 small plants, rising to around 30 a few years later (Mitchell, 1972). Studies made in 1989 revealed that Rats were climbing the stems and eating the seed heads, resulting in minimal regeneration. Resurgence of Tree-mallow usually followed severe winters when Rats and Rabbits were reduced in number. Poisoning of Rats on the ledges in 1990 led to an increase in plant numbers, and at the same time, Rabbits were eliminated from the lower slopes below the site. This resulted in an expansion of numbers and recolonisation of the lower ground. In 1992 a single plant was found beneath the west cliffs at a completely new area, while over 200 plants were counted around the Trammins and below. Many flowered in 1993. The future of this beautiful plant would be guaranteed if Rabbits could be completely eliminated.

It is notable that plants grown from seed planted in autumn 1990 flowered in 1992. Some of these robust plants retained their greenery into 1993 and subsequently flowered profusely.

VIOLACEAE

Viola hirta # (Hairy Violet)

A Swarbrick & Llewellyn-Jones card-listed record from 1964. An unlikely record.

Viola riviniana * (Common Dog-violet)

Common around the south and eastern parts of the island, and growing near the summit. This species flowers mainly from late March until June, but some plants are regularly found flowering into July, August and September.

Viola canina # (Heath Dog-violet)

Mentioned in the Balfour (1845) account but now proved to be *V. riviniana*.

Viola palustris * (Marsh Violet)

First discovered in 1958 at Garry Loch by Alfred Slack, this site has remained the only place where it grows. Its appearance has probably been curtailed through Rabbit activity, but in 1992 it again appeared in reasonable numbers.

SALICACEAE

Populus tremula * (Aspen)

The Rev. Lawson (1895) mentions that, on a walk up the steep and winding "Highlandman's road", grow some "Poplars". These dwarfed and stunted trees were in fact Aspens, and they still grow in the same spot, on a vertical gully high above the Jetty. The maximum height achieved is around 1 m. A natural form of "Bonsai", no doubt modified to this extent by the wind (Plate 3a).

BRASSICACEAE

Arabidopsis thaliana * (Thale Cress)

Grows sparsely but stoutly around the walled areas and near the habitation on the east side. Seldom encountered away from this area.

Barbarea vulgaris * (Winter-cress)

A single plant near South Cottage in 1992 was the first record for Ailsa Craig.

Cardamine pratensis * (Cuckoo-flower)

Recorded by Vevers (1936) and re-discovered in 1993 growing near the summit on a dry grassy slope, an unlikely habitat.

Cardamine flexuosa + (Wavy Bitter-cress)

Identified specifically by A.McG.Stirling on a day visit in 1982 but not collected.

Cardamine hirsuta * (Hairy Bitter-cress)

Common around the lower areas of the island and near the Castle. This species has become more obvious since the elimination of Rabbits from these areas.

Arabis hirsuta # (Hairy Rock-cress)

Perhaps recorded in error, or from the mainland, by Balfour's party of 1844.

Erophila verna * (Common Whitlowgrass)

Frequent on the east side of the island around the buildings and between the Gashouse and the Lighthouse.

Cochlearia officinalis * (Common Scurvygrass)

Probably the earliest flowering plant to be seen on Ailsa Craig. It grows in abundance around the lower parts of the island and particularly in the caves. Some leaves grow to a large size.

Capsella bursa-pastoris * (Shepherd's-purse)

Found scattered near the former garden areas at the Gashouse. This species is very variable and leaves range from being deeply dissected to almost lanceolate and entire. The extremes can be found growing side-by-side.

Brassica napus * (Rape)

Three recent records of this agricultural species have appeared. The first near the Gull roost at Loups Well in 1991 and the second and third at South Cottage in 1992 and 1993. These may have been sown by the agency of Gulls or other bird species.

Coincya monensis # (Isle of Man Cabbage)

One of the few endemic British plants, this species was recorded by Smith (1893) on his first visit to Ailsa. He described it as "up among the cliffs in abundance". He did not record Sea Radish on that occasion, which grows exactly as described. I consider this record erroneous. Unfortunately the entry has been perpetuated in other lists since that first misidentification. I have never found it and have checked many plants on the Trammins over many years, all of which have proved to be the next species. The typical habitat (sandy ground) is absent on Ailsa.

Raphanus raphanistrum ssp. *maritimus* * (Sea Radish)

Grows in abundance on the Trammins. Since the elimination of Rabbits from below these cliffs it has further spread. It is the main foodplant for the Large White butterfly. It is a showy feature of the south cliffs and slopes and now can be found in the vicinity of the Lighthouse. Flowering from March to December, it sometimes covers the slopes below the Trammins (Plate 3c).

ERICACEAE

Calluna vulgaris * (Heather)

Common on the east side of the island only. It grows in abundance on the slopes

below Castle Coomb. The white form is frequent and intermixed with the purple. In August the heather slopes add a splash of colour to the island.

Erica cinerea * (Bell Heather)

Common on the flat areas around the Gashouse and at South Cottage. It also grows from cliff crevices in one or two places. On the upper slopes below the Castle it is frequent and also on some of the rock crests at Loups.

Vaccinium myrtillus * (Bilberry)

Known from only a single site on the north side of Nettleby Howe. It grows from a crack in a rock and is somewhat dwarfed. First recorded by Vevers (1936), it flowers regularly but will clearly only spread if Rabbits are totally eliminated.

PRIMULACEAE

Anagallis arvensis * (Scarlet Pimpernel)

A fine colony of this species grows along the path at the south side of the island between the Foghorn and Rotten Nick. It has been present since the early 1970's and has persisted and flowered each year since.

CRASSULACEAE

Umbilicus rupestris * (Navelwort)

A plant of cliffs and rocks on Ailsa Craig, growing in a large form. Some plants are found in abundance also on the dry earthy ridges at, for example, the Castle. It is often eaten by Rabbits and would no doubt do much better in their absence.

Sedum anglicum * (English Stonecrop)

Very common over much of the island and a feature of the granite crevices and boulders below the cliffs.

SAXIFRAGACEAE

Saxifraga hypnoides # (Mossy Saxifrage)

One of the records noted by Balfour and his students in 1844. It occurs around the Clyde area but I have never seen this species on the island and I very much doubt that it ever did exist on Ailsa Craig.

ROSACEAE

Rubus fruticosus agg. * (Bramble)

A.McG. Stirling has examined the Ailsa bramble specimens and studied them *in situ*. Three microspecies occur on the island, *R. polyanthemus* grows near the Jetty, *septentrionalis* grows on the east slopes of the island at Loups, South Cottage and near the Smiddy building where it grows side-by-side with *ulmifolius*, which also grows at Craignaon.

Potentilla erecta * (Tormentil)

Common among the bracken and low vegetation on the east side of the island. Tormentil also occurs at the area around Garry Loch.

Potentilla anglica * (Trailing Tormentil)

Found growing at a few locations on the east slopes, around the Castle, at Loups and past Goat Ree en route to the summit.

Potentilla reptans # (Creeping Cinquefoil)

Almost certainly a misidentification (by Vevers, 1936) of the previous species. It should not be regarded as an Ailsa species.

Fragaria vesca * (Wild Strawberry)

Found at one or two places near South Cottage and below the Castle. Formerly severely attacked by Rabbits, it has spread in their absence.

Aphanes arvensis * (Parsley-piert)

Recorded in the 1930s by Vevers (1936). Dr J.H. Dickson discovered a specimen on the Castle path in 1983, and, after many years of walking over it, I finally found it in June 1993! More normal sized plants now also grow on the slope below the Castle.

Rosa canina * (Dog-rose)

A single bush grows at the dolerite dyke at Dalton's Cove. There is another small bush on the cliffs just beyond the South Foghorn.

FABACEAE

Lotus corniculatus * (Common Bird's-foot-trefoil)

Now forming showy patches around and within the Lighthouse enclosure area. It was formerly confined to a few cliffy ledges above the Jetty and at Loups Caves, where it still grows. It is a favourite food of Rabbits.

Lotus pedunculatus # (Greater Bird's-foot-trefoil)

A Swarbrick & Llewellyn-Jones card-listed record from 1964, perhaps confused with ripe specimens of the last species, but not subsequently recorded.

Vicia cracca # (Tufted Vetch)

Mentioned by Mackechnie & Ribbons (1973), but the recording card shows only *V. angustifolia*, now *V. sativa* ssp. *nigra*, the species immediately above it on the card. Clearly a simple error of transcription when preparing the note for publication.

Vicia sepium * (Bush Vetch)

Found at one or two places, it is uncommon. There are many plants on a high grassy ledge on the dolerite dyke at Dalton's Cove, and a few plants on the upper ravine at Red Gair.

Vicia sativa ssp. *nigra* * (Narrow-leaved Vetch)

Common around the heather fields at the Gashouse and in front of South Cottage. It is also found in small quantity on the slopes up to the Castle.

Vicia lathyroides * (Spring Vetch)

First noted by Smith *et al.* (1900), and recently re-discovered on the grassy top of the Castle where, isolated from Rabbits, it has persisted. It has recently spread to the area below the Castle in the continuing absence of Rabbits.

Trifolium repens * (White Clover)

Formerly quite scarce but now abundant following the decline in Rabbit numbers.

Trifolium campestre * (Hop Trefoil)

Recorded in a few places around the Lighthouse area and near the old Smiddy

building.

Trifolium dubium * (Lesser Trefoil)

Most trefoils have appeared in abundance since the decline in Rabbit numbers. This species is found on the east side of the island usually near to habitation.

Trifolium pratense + (Red Clover)

I include this species as highly likely, although there is no specimen record since found in 1958 (Mackechnie & Ribbons, 1973). Doubtless recorded in the former gardens at a time when vegetables were grown. It has not persisted.

LYTHRACEAE

Lythrum portula # (Water-purslane)

A card-listed record by Swarbrick & Llewellyn-Jones from 1964, not subsequently located.

ONAGRACEAE

Epilobium montanum * (Broad-leaved Willowherb)

Found around the Dalton's Cove area and below Craignaun cliff on the path just above high tide mark.

Epilobium obscurum * (Short-fruited Willowherb)

Mainly concentrated at the north end of the island around the Red Gair burn both at sea level and up to almost 100 m. above.

Epilobium palustre # (Marsh Willowherb)

Almost certainly a misidentification of *E. obscurum*, by the Balfour party in 1844. I have not located this species anywhere on the island.

Chamerion angustifolium * (Rosebay Willowherb)

A single dwarfed plant growing from the Lighthouse courtyard in September 1993 was the first record of this species for Ailsa Craig.

POLYGALACEAE

Polygala serpyllifolia * (Heath Milkwort)

The deep blue flowers of this small plant can be found among the heathers at the Gashouse and near the path to the Castle. It is not very common but is restricted to the eastern slopes between the Castle and the Lighthouse.

GERANIACEAE

Geranium molle * (Dove's - foot Crane's-bill)

Scattered around the grassy areas near the buildings on the east side of the island. It is scarce and perhaps will thrive in the absence of Rabbits.

Geranium robertianum * (Herb-Robert)

Found growing among the granite blocks at the ruined Smiddy building in 1989. It has flourished but remained within the confines of this building.

Erodium cicutarium * (Common Stork's-bill)

Frequent on disturbed ground. It appears regularly around the various buildings

and also on some of the earthy ledges at the Trammins, particularly near the Foghorn.

ARALIACEAE

Hedera helix * (Ivy)

A feature of the granite faces at Dalton's Cove, where the largest patches occur. Elsewhere it is not uncommon on the dolerite exposures above the Lighthouse area and at the Castle path and on similar substrates at the Loups Caves and beyond.

APIACEAE

Hydrocotyle vulgaris * (Marsh Pennywort)

Recorded by Balfour in 1844 and subsequently by others, from Garry Loch. It remained unrecorded since the 1950s until 1992 when one small patch was found at the smaller pond. It is doubtless heavily grazed by Rabbits, only appearing in their absence.

Aegopodium podagraria * (Ground-elder)

A few plants growing in 1992 at the former lightkeeper's gardens represent the first record for this species on the island. It has not flowered.

Oenanthe crocata * (Hemlock Water-dropwort)

Found in 1969 below the Barestack cliff by myself and John Mitchell. No doubt a tuberous root was washed up by the tide. It did not persist and a few years later had gone.

Aethusa cynapium * (Fool's Parsley)

A single plant grew during 1991 near the lightkeeper's gardens, below a wire fence. It was probably introduced by birds. It did not re-appear in 1992 despite producing many fruits.

Apium inundatum # (Lesser Marshwort)

Said to have been recorded from the Garry Loch area by some of the party who visited the island with Landsborough in 1830. I find this record very dubious and suggest that the small white flowers which they found abundant were those of *Galium saxatile* which still grows in abundance around the Garry Loch area.

Angelica sylvestris * (Wild Angelica)

The commonest umbellifer on Ailsa. It grows along most of the north-east side of the island, mainly along the lower parts. Elsewhere it is scarce. Some plants grow very robustly but others are dwarfed and slender, and some grow from the cracks in the rocks.

SOLANACEAE

Lycopersicon esculentum + (Tomato)

Recorded by Dr. J.H. Dickson from below a boulder scree near Garry Loch in 1983. It may have been introduced by avian or human agency.

BORAGINACEAE

Anchusa arvensis * (Bugloss)

Found mainly on the lower south side of the island, usually in the vicinity of the Foghorn. Its numbers fluctuate from year to year.

Myosotis arvensis * (Field Forget-me-not)

A variable plant on Ailsa, but quite common around the east and south parts of the island. Some individuals are very small and dwarfed which may have led to confusion with the next species.

Myosotis ramosissima # (Early Forget-me-not)

This is a rare species in the Clyde area and is mentioned in the account by Balfour (1845). However it has never been located since then and its confusion with dwarfed specimens of *arvensis* (and some are tiny), has probably been the reason for its past inclusion.

Myosotis discolor # (Changing Forget-me-not)

I reluctantly dislodge this species from the regular Ailsa flora, as it could easily occur and be overlooked. It was listed first by Vevers (1936), however until such times as it is proved to occur, Ailsa should not be regarded as a station.

LAMIACEAE

Lamium purpureum # (Red Dead-nettle)

A Swarbrick & Lewellyn-Jones card-listed record from 1964, doubtless confused with the next species.

Lamium confertum * (Northern Dead-nettle)

Scattered mainly around the former garden areas and near the Lighthouse. It is not a common species on Ailsa.

Lamium amplexicaule # (Henbit Dead-nettle)

Noted by Howitt (1976) but not recorded since. This record requires confirmation.

Galeopsis tetrahit * (Common Hemp-nettle)

There are two recent records, from the area near the Gashouse in 1991.

Teucrium scorodonia * (Wood Sage)

Common on the east side of the island but more scattered elsewhere. This plant is a feature of the low rocky ground on Ailsa.

Prunella vulgaris * (Selfheal)

Formerly a small and heavily grazed plant on Ailsa, it grew rapidly and robustly in 1991 after the main destruction of Rabbits from the lower areas of the island. In 1992 it again appeared commonly but in a more typical size.

Thymus polytrichus * (Wild Thyme)

Restricted to a few places on the island. The most obvious location is on the dolerite dyke at Dalton's Cove where there is a large clump. This species should increase in the absence of Rabbits.

CALLITRICHACEAE

Callitriche platycarpa * (Various-leaved Water-starwort)

Grows at one or two wet seepage areas, such as at Garry Loch and Blue Hone Quarry.

PLANTAGINACEAE

Plantago coronopus * (Buck's-horn Plantain)

Growing commonly on rocks, walls and pathways in a small form and also a large fleshy form, which resembles superficially the next species.

Plantago maritima # (Sea Plantain)

I have not recorded this species, despite much searching. Smith *et al.* (1900) mention it growing on the south cliffs but every specimen in such locations has proved to be *P. coronopus*. A specimen record is required for this species on Ailsa Craig.

Plantago major * (Greater Plantain)

Scarce, found around South Cottage and near the west wall of the Lighthouse enclosure.

Plantago lanceolata * (Ribwort Plantain)

Common and occasionally growing to a large size on some of the cliff sites such as at the North Foghorn. Mackechnie & Ribbons (1973) noted the unusually broad leaves of this species.

SCROPHULARIACEAE

Cymbalaria muralis * (Ivy-leaved Toadflax)

An attractive little plant gracing the walls surrounding the Lighthouse areas. It sometimes dies out in periods of prolonged drought but usually manages to quickly re-establish itself. It can also be found growing on the ground, among the small rounded boulders, sometimes in large patches. It is eaten by Rabbits, which may explain its adherence to vertical sites.

Digitalis purpurea # (Foxglove)

A poisonous species such as this should perhaps persist on Ailsa but it has not. It was first listed in June 1958 (Mackechnie & Ribbons, 1973). If in the vegetative state only, it may have been confused with *Arctium*. It would be a splendid plant for Ailsa to have.

Veronica serpyllifolia * (Thyme-leaved Speedwell)

A few plants recorded growing on the slopes immediately below the Castle and on the path at the base, in the absence of Rabbits.

Veronica officinalis * (Heath Speedwell)

Grows around the east side of the island, mainly near the Gashouse and lighthouse buildings.

Veronica chamaedrys * (Germander Speedwell)

Frequent among the Bracken in the area enclosed by the Gashouse wall, not very often met with outside this area.

Veronica arvensis * (Wall Speedwell)

Now commonly found around and just outside the Gashouse walled area. This species was small and only found on the walltop before Rabbits were eliminated. After one season it appeared in profusion and growing vigorously.

Veronica agrestis # (Green Field-speedwell)

I have never located this species, first recorded by Smith in 1893, who listed no other species. It is not particularly common in the Clyde area and requires confirmation for Ailsa.

Veronica persica * (Common Field-speedwell)

A few plants growing around South Cottage in 1991 produced many new plants in 1992. While Rabbits remain controlled, this species will probably flourish. It flowers well into December. First noted by Swarbrick & Llewellyn-Jones in 1964.

Euphrasia officinalis auct. # (Eyebright)

Several past visiting botanists such as Balfour (1845) and Smith (1893), have claimed to have found *Euphrasia*, but in 10 years I have not located any. Their occurrence seems very likely, but again there are no supporting specimen records to verify species and confirm their place in the island's flora.

CAMPANULACEAE

Jasione montana * (Sheep's-bit)

Previous accounts, eg. Smith *et al.* (1900), mention the dwarfed forms of *Jasione* found on Ailsa. This appears to have been due to constant Rabbit cropping. Following the Rabbit decline, this species now grows strongly and in profusion around the lower east and south sides of the island and on the slopes at Loups and further north.

RUBIACEAE

Galium saxatile * (Heath Bedstraw)

This little plant is found frequently around the lower parts of the island but from the Castle upwards it is much commoner. It grows in abundance around Garry Loch and up to the summit cairn.

Galium aparine * (Cleavers)

Fairly common around the lower east side of the island near the former habitation areas. It also grows from among the boulders under the west cliffs and is, in such situations, long and straggly.

CAPRIFOLIACEAE

Sambucus nigra * (Elder)

The area around the slopes above the South Foghorn is known as The Bourtrees. Here a small grove of Bourtrees or Elders still grow, and have done so since the middle of last century. Elders also crop up elsewhere, such as below the Gannetry at the Trammins and at the steep gully called Clashwaun on the upper south slopes. There are also odd Elders near the Smiddy and at the Gashouse as well as on the ridges at and above the Castle.

Lonicera periclymenum * (Honeysuckle)

The sweet smell of Honeysuckle can often be encountered on a still summers evening. Large banks grow from the cliffs at Craignaun and above the Loups Caves. There are also plants at the Gasometers and on the ground at various points below the east slopes. It appears to be confined largely to the east side of the island.

DIPSACACEAE

Succisa pratensis * (Devil's-bit Scabious)

A late-flowering species on Ailsa Craig, seldom in bloom before the end of July.

It grows at the Loups Well and on the slope above the North Foghorn, and perhaps at one or two places between these points but nowhere else.

ASTERACEAE

Carlina vulgaris # (Carlina Thistle)

Noted first by Smith *et al.* (1900) who was unsure of the identification and questioned his own record. Perhaps mistaken for dried or dwarfed specimens of Spear Thistle, firm evidence of its existence on Ailsa is required. Swarbrick & Lewellyn-Jones added it to their card-list in 1964. I consider it extremely dubious, although it grows on the Ayrshire coast opposite Ailsa Craig.

Arctium minus ssp. *nemorosum* * (Lesser Burdock)

This species is found commonly around the basal area of the island and on the ridge at the Castle. It grows robustly in places, producing very large leaves.

Carduus tenuiflorus * (Slender Thistle)

This scarce species grows in a fairly restricted area of dry gravelly habitat below the Trammins just beyond the South Foghorn (Plate 3b). Its numbers vary from year to year. First recorded by Balfour (1845).

Carduus crispus (*acanthoides* auct.) # (Wetted Thistle)

This species has doubtless been listed in error by Smith *et al.* (1900), probably in mistake for the last. It should not be regarded as part of the Ailsa flora until such times as a specimen record is to hand.

Cirsium vulgare * (Spear Thistle)

A common species around the Foreland Point area and also on the slopes. The highest plant grows at an altitude of about 300 m. It is a foodsource for the small numbers of Twite which regularly nest on the island.

Cirsium palustre # (Marsh Thistle)

I have not recorded this species. First noted by Mackechnie & Ribbons (1973), in 1958, along with the next species. It may have been an isolated record, but requires confirmation.

Cirsium arvense * (Creeping Thistle)

Common around the Gashouse area and at the sheltered walled areas. There are a few other sites such as under the East Trammins and on a damp area near the north end of Nettley Howe.

Onopordum acanthium # (Cotton Thistle)

Card-listed by Swarbrick & Llewellyn-Jones in 1964, probably thought of as "Scotch Thistle", in mistake for *Cirsium vulgare*, which was not noted by them and is abundant.

Lapsana communis * (Nipplewort)

A single plant flowered near the Gashouse in 1991. This was the first Ailsa record.

Hypochaeris radicata * (Cat's-ear)

An abundant species around most of the island. There are particularly fine displays at Craignaun cliffs, on the Trammins and at the Loups Caves. It flowers early

in the spring and well into December.

Leontodon autumnalis # (Autumnal Hawkbit)

A possible species for Ailsa but confusable with other similar species. This was recorded by Balfour's party in July 1844. A specimen record is required.

Leontodon hispidus # (Rough Hawkbit)

Another possible, but perhaps unlikely species for Ailsa. It was first listed by Smith (1896) but may have been confused with some of the rather variable plants of *Hypochaeris*.

Sonchus oleraceus # (Common Sow-thistle)

Recorded by Balfour (1844) and Smith (1893). I have been unable to locate this species on the island. Plants resembling it have all proved to be the next species, *S. asper*, on closer examination. I doubt if it ever did occur on Ailsa.

Sonchus asper * (Prickly Sow-thistle)

Common around the lower parts of the island, particularly in the vicinity of the buildings, and under the west cliffs below the Gannetry. It is not always spiny and varies in size from very small to very large plants. Examination of seeds from all the *Sonchus* species collected to date have proved to be only this species.

Taraxacum officinale agg. * (Common Dandelion)

Microspecies of Dandelions collected on Ailsa have to date proved to be the following, *T. argutum* (Section: *Erythrosperma*), *T. unquillobum* (Section: *Celtica*), *T. dahlstedtii* and *T. vastisectum* (Section: *Ruderalia*). Their exact status requires further surveys to be made.

Crepis capillaris # (Smooth Hawk's-beard)

A yellow Composite which really needs a specimen record to be admitted to the Ailsa list. This species appears very unlikely and was first mentioned by Vevers (1936).

Pilosella officinarum # (Mouse-ear Hawkweed)

Recorded on cards by Swarbrick and Llewellyn-Jones in 1964, but doubtless the next species which in the past has also been named *H. murorum* (Lee, 1933), a now redundant name.

Hieracium sp. [Section : *Oreadea*] * (Hawkweed species.)

Grows at one or two main localities on the south and east side of the island, largely on the cliffs. There are at present perhaps only 20 plants in total. Mr D. J. McCosh has commented *in litt.* on the specimens he has examined as follows "... it belongs to *Hieracium* Section *Oreadea* and does not precisely match any of the currently recognised members of that Section." Further study of this plant will be made over the next few seasons.

Solidago virgaurea * (Golden-rod)

A late summer plant which grows mainly on the north-east slopes. It is frequent around the tops of the Loups Caves and at Swine Cave. In 1992 a few plants were found growing on the flat ground near South Cottage. It may spread from its cliff sites if Rabbits are eliminated.

Bellis perennis * (Daisy)

Like many common species Daisies were formerly few and far between. After

Rabbit control they sprang up in many places, but mainly around the buildings on the east side.

Artemisia vulgaris * (Mugwort)

A single well-established plant formerly grew beside the lighthouse until, in 1982, it was "tidied up" and burnt by a horticultural lightkeeper. It may yet arise from the ashes.

Achillea millefolium * (Yarrow)

A recent (1990) find from the area near the former tin shed near the Jetty. Several plants grow on the grassy slopes of the path down to the shore.

Chrysanthemum segetum # (Corn Marigold)

Card-listed by Swarbrick & Llewellyn-Jones in 1964, it may have been a garden escape, if this was the actual species involved. Normally found in arable fields, it is an unlikely species for an island such as Ailsa.

Matricaria discoidea # (Pineapple-weed)

Card-listed by Swarbrick & Llewellyn-Jones in 1964, it may have been a genuine record but could have been confused with other species.

Tripleurospermum maritimum * (Sea Mayweed)

Common around the Lighthouse area and in the vicinity of the buildings and former gardens. This species also flowers into December.

Senecio jacobaea * (Common Ragwort)

Common around the flat and sloping areas behind the Lighthouse and at the South Foghorn, where there are good stands. Elsewhere it is mainly solitary, but can be encountered almost anywhere and at any altitude. A tiny form appears to be common on sparse soil.

Senecio vulgaris + (Groundsel)

A species mainly connected with gardening and no doubt recorded in the past from the lightkeepers' gardens. It has died out and no longer grows anywhere on the island.

Tussilago farfara * (Coltsfoot)

First found in 1989 (Zonfrillo, 1990) at the Red Gair, beside the North Foghorn. Thanks to a landslip precipitated by Rabbit erosion it now grows at the foot of the cliffs beside the Foghorn on the earthy deposits.

ZOSTERACEAE

Zostera marina # (Eelgrass)

An extremely unlikely species for Ailsa, first listed by Balfour's party in 1844. The specimen then probably came from the Ayrshire coast, as mentioned in Balfour's text (1845). Ailsa is patently unsuitable since the beaches slope steeply and the tideline boulders are very frequently re-arranged by winter storms.

JUNCACEAE

Juncus squarrosus # (Heath Rush)

This species was clearly misidentified by Smith *et al.* (1900), when he recorded it from the Garry Loch area. He did not record *J. bulbosus*, which does grow there in

profusion, as found by Balfour in 1844. I have not found it in recent times and there is no specimen record.

Juncus bufonius * (Toad Rush)

First recorded in 1992 from a wet puddle at Blue Hone Quarry. The puddle is fairly persistent so it should survive.

Juncus bulbosus * (Bulbous Rush)

Grows in profusion in and around the Garry Loch area and at one or two damp spots on the pathways on other ridges.

Juncus effusus * (Soft-rush)

Specimen records of this species were collected by Dr J.H. Dickson in 1983 from inside one of the Gasometers. During building alterations to the Lighthouse in 1989 much rubbish was tipped into the rusting Gasometer, destroying most of the vegetation including this rush.

Juncus conglomeratus * (Compact Rush)

First noted by Howitt (1976) from near the Lighthouse. No further records until a single plant appeared near the Goat Ree, above Garry Loch, in August 1993.

Luzula pilosa * (Hairy Wood-rush)

Found under the Bracken and among the Heather on the east side of the island. It is not very common, but is well established.

Luzula sylvatica * (Greater Wood-rush)

Grows sporadically at points along the north-east slopes. The main concentration is at the high slope above Blue Hone Quarry. Here it forms almost a monoculture. There are smaller patches on the west cliffs at Ashydoo and around the Loups slopes.

Luzula campestris * (Field Wood-rush)

Not very common, but grows among the *Erica* mainly on the slopes between the Jetty and the Lighthouse, and on the path above the Castle.

CYPERACEAE

Isolepis setacea # (Bristle Club-rush)

Balfour's party of 1844 noted a "dense mass" of this species at Garry Loch, (Balfour, 1845). It was almost certainly a close-cropped area of Bulbous Rush, which does form a dense mat at that location and frequently has the tops eaten by Rabbits when the ponds dry out. It has never been seen since it was first noted and the pollen is not present in the core samples analysed by Paton (1976). Balfour also mentions Bulbous Rush at Garry Loch, as well as Goats and Sheep.

POACEAE

Festuca rubra * (Red Fescue)

Perhaps the island's commonest grass, growing in a wide variety of forms, both at ground level and on the vertical cliffs.

Festuca ovina ssp. *ovina* * (Sheep's-fescue)

Recorded in lists since Balfour (1845), but not until 1993 did I find any flowering heads. Vevers (1936) found it at the summit area, and, without Rabbits, this is where it still remains.

Lolium perenne * (Perennial Rye-grass)

This grass grows at one or two spots near the Lighthouse but is not common.

Vulpia bromoides * (Squirreltail Fescue)

A small patch grows regularly at the wall beside the Gashouse, it was first found in 1958. I have not found it elsewhere on the island.

Cynosurus cristatus * (Crested Dog's-tail)

One location for this species exists, viz. at the path from the Gashouse wall to the Gashouse, where several plants have grown up since the absence of both Rabbits and Humans.

Puccinellia maritima # (Common Saltmarsh-grass)

As the name suggests this species would find no suitable typical habitat on Ailsa. First noted by Ververs in 1936, (who did not record the very common *F. rubra*). I have not found it and would require a specimen record to be convinced of its existence on the island.

Poa annua * (Annual Meadow-grass)

This species is reasonably common around the lower parts of the east and south sides of the Craig, often growing strongly.

Poa trivialis * (Rough Meadow-grass)

A few localities have been noted for this species usually found around the south and east slopes, but also at the north foghorn.

Poa pratensis * (Smooth Meadow-grass)

Frequent, mainly on the north, south and east sides of the island.

Poa angustifolia * (Narrow-leaved Meadow-grass)

Recorded from one locality near Garry Loch in 1992.

Dactylis glomerata * (Cock's-foot)

Found in a few places, near the Gashouse Elders, at the Tacksman's Cottage, near the Jetty and near to the ruined Smiddy Building. Otherwise it is distinctly uncommon.

Arrhenatherum elatius * (False Oat-grass)

This tall grass grows at a few places on the east side of the island. There are patches at the Jetty, Dalton's Cove and near the Smiddy Building and some at the path side to the Loups Well.

Avena sativa * (Oat)

Found growing at one spot by the Castle Path where grain had been put down, as Rat poison, intermixed with Wheat.

Koeleria macrantha * (Crested Hair-grass)

Found growing at two places, on a ledge above Dalton's Cove and near the South Foghorn. This is normally a plant of base-rich soils.

Deschampsia flexuosa * (Wavy Hair-grass)

Fairly common on the eastern slopes of the island and prominent on the Heather slopes.

Holcus lanatus * (Yorkshire Fog)

Very common and luxuriant over much of the island. It occurs in two forms, the yellowish and the purple. It has become more obvious since Rabbits have been controlled.

Holcus mollis * (Creeping soft-grass)

Grows in a few places around the lower parts of the island but the best stands are seen around Garry Loch.

Aira caryophyllea * (Silvery Hair-grass)

Frequent on the lower east side of the island, mainly near the buildings, where it forms noticeable patches.

Aira praecox * (Early Hair-grass)

Not very common, and restricted mainly to the boulder beaches of the south and to the pathways. It is often found in a large form.

Anthoxanthum odoratum * (Sweet Vernal Grass)

Fairly common on the lower east slopes and on the cliffy ledges. It can grow robustly in such situations.

Agrostis capillaris * (Common Bent)

An uncommon species, only a few patches on the lower east and south parts of the island.

Agrostis stolonifera * (Creeping Bent)

Not a very common grass but found by the pathways at the east and south, below the walled areas of the Gashouse and at Loups.

Agrostis canina * (Velvet Bent)

This grass is frequent near the pathways on the east side and at the Castle.

Alopecurus pratensis # (Meadow Foxtail)

A card-listed record by Swarbrick & Llewellyn-Jones from 1964, probably confused with the next species which they did not list.

Alopecurus geniculatus * (Marsh Foxtail)

The small pond at Garry Loch has a stand of this species which grows larger than normal. There was also a single small plant growing from a wet spot on the pathway just beyond Loups.

Bromus hordeaceus * (Soft-brome)

Found growing only on the vegetated granite ledges at Craignaon, and on the nearby dolerite seam. Now spreading onto the ground below in 1993, in the absence of Rabbits.

Elytrigia repens * (Common Couch)

This species may have arrived with the help of Man. It grows at the walled Lighthouse enclosure in one small patch.

Elytrigia atherica # (Sea Couch)

Card listed by Swarbrick & Llewellyn-Jones in 1964 (as *Agropyron pungens*), this grass of sandy beaches has never been re-located.

Hordeum distichon * (Two-rowed Barley)

An accidental introduction in Rat-bait, from 1992.

Triticum aestivum * (Bread Wheat)

As a result of Rat eradication during 1991 & 1992, 6 tonnes of whole-Wheat bait, impregnated with Warfarin, was spread over the island. It has germinated at several places but will hopefully die out. However, to date, it has grown sturdily from between granite rocks with little soil, producing fine healthy heads.

LILIACEAE

Hyacinthoides non-scripta * (Bluebell)

There are few finer stands of this species than those on Ailsa. In spring Bluebells form a blue haze across the island, even to the summit, and present a wonderful sight. In another age, they probably grew beneath the Willows which at one time grew around the Garry Loch area (Paton, 1976). The bulbs are a major source of food for Rabbits in winter, the leaves are not eaten.

Allium ursinum # (Ramsons)

A completely spurious record which first came to light, unacknowledged, in the B.A. Handbook of 1901 (Elliot *et al.* 1901).

Narcissus pseudonarcissus agg. * (Daffodil)

Some Daffodils grow on the slope behind South Cottage (four variants), and were undoubtedly throw-outs from cultivation. They have persisted in this area since the 1920s.

ORCHIDACEAE

Dactylorhiza fuchsii or *purpurella* (+) (Common Spotted or Northern Marsh Orchid)

A single withered fruiting stem of probably one or other of these species was found in August 1983 by A. Laing near Garry Loch. It was examined *in situ* by Dr J.H. Dickson *et al.* at the time. There have been no further appearances, although the habitat for orchids on Ailsa seems perfect.

Acknowledgments

Mr. John Mitchell first brought the fascination of the Ailsa flora to my attention and generously gave access to all his previous correspondence on the subject, which lightened greatly the task of researching the literature.

Mr. Alfred Slack gave valuable advice in locating vital specimens, a tribute to his memories of a day visit 34 years ago! Mr. James Girvan added some details of the human occupation of the island and Mr. David McCosh kindly advised on the identity of the specimens of *Hieracium* which were sent to him. Similarly, Dr. A.J. Richards kindly identified the microspecies of Dandelions collected. Mr. Allan Stirling, BSBI recorder for Ayrshire and Dr. James H. Dickson, Botany Dept., Glasgow University, spent much time

verifying and identifying the specimen records. They also gave great encouragement throughout, and improved greatly the final draft of this paper. I am particularly indebted to them and to Dr. Patricia Monaghan, Zoology Dept., Glasgow University for her help over the years. The Most Hon. The Marquess of Ailsa, O.B.E., allowed me the privilege of working on his island, and provided vital historical data.

I offer my sincerest thanks to all of the above mentioned persons for their generous help and encouragement.

References

- BALFOUR, J.H., 1845. An account of a botanical excursion to Ailsa Crag in July 1844. *Phytologist*, 2: 257-263.
- CAMPBELL, J.M., 1892. On the appearance of the Brown Rat (*Mus decumanus*) on Ailsa Craig. *Ann. Scot. nat. Hist.* : 132-134.
- DICKSON, J.H., 1991. *The Wild Plants of Glasgow*. Aberdeen University Press.
- ELLIOT, G.F.S., LAURIE, M. & MURDOCH, J.B., 1901. *Fauna, Flora and Geology of the Clyde Area*. British Association. Glasgow.
- GIBSON, J.A., 1952. Fall of cliff at Ailsa Craig, affecting the Gannet colony. *Scott.Nat.* 64 : 118 -119.
- HARRISON, R.K., STONE, P., CAMERON, I.B., ELLIOT, R.W. & HARDING, R.R., 1987. Geology, petrology and geochemistry of Ailsa Craig Ayrshire. *Rep. Br. Geol. Surv.* Vol 16: 9. HMSO.
- HOWITT, R.C.L., 1976. New Botanical Records from Ailsa Craig. *Western Nat.* 5: 111.
- LAWSON, R., 1895. *Ailsa Craig its History and Natural History* (2nd ed.). Paisley.
- LANDSBOROUGH, D., 1852. *Excursions to Arran, Ailsa Craig & the two Cumbraes*. Edinburgh.
- LEE, J.R., 1933. *The Flora of the Clyde Area*. Glasgow.
- LEE, J.R., 1953. Additions to the Flora of the Clyde Area. *Glasg. Nat.* 17 : 65 -82.
- MITCHELL, J., 1972. Two Centuries of Botanical Recording on Ailsa Craig. *Western Nat.* 1: 26-35.
- MACKECHNIE, R. & RIBBONS, B.W., 1973. Short Notes - Ailsa Craig. *Glasg. Nat.* 19: 70.
- PATON, A., 1976. A study of the vegetational history of Ailsa Craig. *BSc. Hons. Project*. Glasgow University Botany Dept. Unpublished.
- PENNANT, T., 1774. *A Tour in Scotland and Voyage to the Hebrides, 1772*. Chester.
- PERRING, F.H., and WALTERS, S.M., 1962. *Ailas of the British Flora*. London.
- SMITH, J., 1893. Ailsa Craig. *Ardrossan & Saltcoats Herald*. 8th & 15th December 1893.
- SMITH, J., 1896. *The Botany of Ayrshire*. Ardrossan.
- SMITH, J., PATTERSON, J., & WATT, H.B., 1900. The Natural History of Ailsa Craig. *Ann. Anderson. nat. Soc.*, 2: 135-154.
- STACE, C.A., 1991. *The New Flora of the British Isles*. Oxford University Press.
- VEVERS, H.G., 1936. The land vegetation of Ailsa Craig. *J. Ecol.*, 24: 424-445.
- VEVERS, H.G., 1948. The natural history of Ailsa Craig. *New Naturalist Journal*, 1: 115-121.

ZONFRILLO, B., 1991. The Ferns of Ailsa Craig and their distribution. *Glasg. Nat.* 22: 1 59-64.

ZONFRILLO, B., 1990. Three new plant records from Ailsa Craig. *Glasg. Nat.* 21:5 609 - 610.

Book Review

Flowers of Iona, 2nd edition

JEAN S. MILLAR

The New Iona Press Ltd., 1993, 52 pp., illustrated with original water colours by the author. Limpback, ISBN 0 9516283 3 X, £4.95.

This attractively produced booklet is an update of the first edition which was published more than 20 years ago. The number of plant species recorded has now more than doubled, mainly due to the inclusion of the grasses, sedges and rushes, as well as an appreciable number of additional species recorded since the first edition. The result is a very thorough account of the island flora as at present known, providing for the reader a handy information guide, whether they be informed botanists or holiday visitors wishing to identify the more eye-catching flowers.

The text opens with a general introduction to the island's geology, topography, climate and agricultural practices. The possible influence of the large number of summer visitors is also discussed, though the effect of this annual influx on the ecology is not yet clear. The remainder of the text consists mainly of descriptions of the island vegetation under five headings – Spring Flowers, Sandy Shore, Machair, The Hill and Rock Face. There is also a short account of previous botanical recording and recorders.

In the plant list, which occupies the remaining pages, the entry for each species comprises the latin name and Gaelic equivalent, followed by a brief description of frequency and habitat.

The author's own illustrations merit the fullest praise, being extremely true to life in form and colour. They are grouped according to habitat types described in the text. Visitors and others wishing to learn more of Iona's plant life should find this little volume indispensable.

ALLAN STIRLING

Scottish Orchids as Postage Stamp Designs

MARY BATES¹ and J. H. DICKSON²

¹ Royal Botanic Garden, Edinburgh

² Botany Department, University of Glasgow

Shortly after the acceptance of Glasgow as the host city for the 14th World Orchid Conference, held in Spring 1993, the Royal Mail was approached by Paddy Woods of the Royal Botanic Garden, Edinburgh, regarding the issue of a set of orchid stamps to commemorate the event. An English artist, Pandora Sellars, and the three Scottish-based artists, Elizabeth Blackadder, Jillian McDougall and Mary Bates, were asked to submit designs, each artist with a different brief. The designs ultimately selected were those of Pandora Sellars, and depicted three plants linked historically with orchid growing in Britain and two connected with orchid research at the Royal Botanic Garden, Edinburgh.

M.B.'s brief was to produce designs based on Scottish native species. Orchids were selected which are characteristic of different habitats and which themselves are of great interest or rarity. The sites were visited, sketches of the plants and their habitat were made, and colours were matched preparatory to completion of the designs. These visits served a dual purpose, as work was also in progress on the book "Wild Orchids of Scotland." The designs for these stamps are reproduced in Plate 4 by courtesy of the Royal Mail, the copyright holders.

Wild orchids may seem somewhat unexpected in urban habitats. However, in Glasgow three species are readily found: *Dactylorhiza fuchsii* (Common Spotted-orchid), *D. purpurella* (Northern Marsh-orchid) and *Epipactis helleborine* (Broad-leaved Helleborine); see "Wild Plants of Glasgow." The last named, one of the stamp designs, may be commoner in Glasgow than elsewhere in Britain. It grows in a wide variety of habitats from gardens to railway embankments to overgrown pit bings. It flowers from July to September.

The most characteristic orchid of the native Scottish Pine Woods is *Goodyera repens* (Creeping Lady's-tresses). It has spread to coniferous plantations, including a few in England, but in Britain is largely confined to Scotland where there are some extensive colonies. The evergreen leaves have a net-veined pattern and the sweetly scented flowers are produced in July and August.

Machair is a distinctive habitat which, although not exclusive to Scotland, is particularly associated with the Western Isles. One orchid that is endemic to Scotland, only occurring on a small area of machair on North Uist, is *Dactylorhiza majalis* subsp. *scotica* (Western Marsh-orchid). This little orchid makes a spectacular array in late May and June when it flowers in hundreds with *D. incarnata* subsp. *coccinea* (Early Marsh-orchid) and *D. purpurella* subsp. *purpurella*.

Orchis morio (Green-winged Orchid) is not uncommon in Britain but in Scotland is currently known only from one locality in Ayrshire, where it has recently suffered a considerable loss of habitat because of road realignment. It grows in a fairly open situation in short grazed turf, and flowers from May to June.

A rare orchid which in Britain occurs only in the west of Scotland is *Dactylorhiza lapponica* (Lapland Marsh-orchid). It grows in base-rich wet hill flushes, flowering from May to July. At one locality it grows with *D. traunsteineri* (Narrow-leaved Marsh-orchid), another Scottish rarity.





a. Clouded Yellow Butterfly (*Colias crocea*)



**b. Frog Orchid
(*Coeloglossum viride*)**



**c. Pitcher Plant
(*Sarracena purpurea*)**

Ten Years of Population Counts of Orchids at Dumbrock Loch Meadows, Stirlingshire and Problems of Management

C. A. DICKSON¹ and W. PARKES²

¹ Botany Department, University of Glasgow,
Glasgow G12 8QQ

² 41 Crawford Road, Milngavie, G62 7LE

Dumbrock Loch meadows (NS550783) (V.C.86) is now a Site of Special Scientific Interest (Fig. 1) partly for its unimproved herb-rich grassland and partly for the wild orchids which grow there, in particular *Coeloglossum viride* (Frog Orchid). The other species which form the basis of our survey are *Listera ovata* (Common Twayblade), *Platanthera chlorantha* (Greater Butterfly-orchid), *Gymnadenia conopsea* ssp. *borealis* (Fragrant Orchid), *Dactylorhiza fuchsii* (Common Spotted-orchid), *D. maculata* ssp. *ericetorum* (Heath Spotted-orchid) and *D. purpurella* (Northern Marsh-orchid).

When the site first became known to C.A.D. winter grazing by cattle had ceased a year or two previously but many flowering plants of *Gymnadenia conopsea* were already overgrown by a substantial growth of Bracken (*Pteridium aquilinum*). In 1984 we began cutting the Bracken and decided to record annual numbers of flowering orchids to assess the efficacy of the conservation measures. The counts began in 1983 and continued for a total of ten years; other colonies were recorded as they were found and as recorders volunteered to help.

Meteorological data were obtained from the records at Abbotsinch, Glasgow, 13km south-west of the site.

The site

The meadows are exceptional in their habitat diversity ranging from dry thin soils to mires and lochside and groundwater flushes.

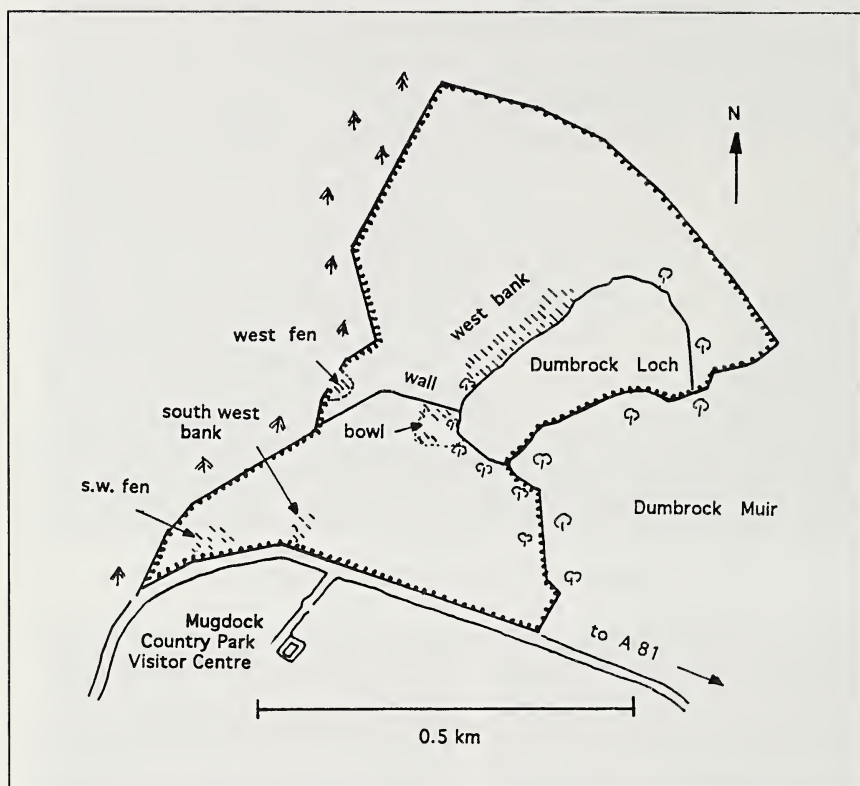


Figure 1. Dumbrock Loch meadows SSSI. The orchid-rich areas are shaded.

Much of the area has basalt lavas of the Campsie volcanic series near to and at the surface, with the result that ploughing has never been undertaken successfully. The meadows have therefore remained as one of the now scarce British examples of an area of unimproved grassland with its attendant rich flora. A survey of the west bank of the loch, restricted to the orchid-rich areas, has produced some 70 species of flowering plants and ferns. A depression (the bowl) just south of the east-west wall at the southern end of the loch has over 30 mainly heathy grassland species in the northern part whereas the southern part, of deeper soils, has over 35 species in the twayblade-rich area (16 species are shared). This diversity is being maintained by management, chiefly by the removal of invading species which are changing the remaining dry areas of the SSSI to heathland in part dominated by Heather (*Calluna*) and purple moor-grass (*Molinia*

caerulea) or Bracken (*Pteridium*), or to grassland with encroaching scrub and Tufted Hair-grass (*Deschampsia cespitosa*).

In the early years we counted all the *Dactylorhiza* flowers in one evening together with those of *Gymnadenia* and *Platanthera* but, as *D. purpurella* flowers earlier and *D. fuchsii* later than the other species, both may be an underestimate. Another source of error can arise where orchids grow sparsely over large areas or thickly together, although methods were devised to avoid double counts by using vegetation markers such as bracken fronds. It was found useful for two people to count denser areas together; one to identify, the other to record the numbers. Where appropriate these and other problems in recording are discussed in the section on each orchid.

Listera ovata (Common Twayblade)

The colony of *Listera ovata* is confined to the southern end of the bowl and its north-facing slope and has been recorded throughout by Monica Thorp. This is the longest-lived orchid studied at the site. The seed develops into a long-lived rhizome and the first leaf is produced in the 4th year. A total of 13 to 15 years from seed to flower (Summerhayes 1968, pp.3, 168) and a flowering period of over 43 years has been recorded (Inghe & Tamm, 1988). The propagation is usually vegetative, a new plant rising from the rhizome annually with few plants originating from seedlings, although branching rhizomes develop buds producing new plants which may flower in three years or so (Summerhayes 1968, p. 22). After the first 13 or more years of establishment many new plants could develop from these buds, flowering where conditions were favourable. Following the eventual death of the parent these continue a separate existence (Summerhayes 1968, pp. 22, 171). For individual plants flowering seems to be intermittent (Inghe & Tamm, 1988, Fig.A1). Correlation has been noted between flowering frequency and summer precipitation the previous year, summer drought reducing flowering the following year (Inghe & Tamm, 1988). Such trends can however only be clearly seen when observations have been made over many years. Fig. 2 shows in the first column for each year the number of plants showing twin leaves only; these have been estimated as a proportion for 1984, 1985 and 1987. The graphs show a steadily-expanding flowering population up to 1992 in spite of the vegetation becoming denser. There are possibly fewer non-flowering plants in the later period. Conservation management has concentrated on partial removal of, in the order in which they became prominent, Bracken, Raspberry

(*Rubus idaeus*), Thistles (*Cirsium* spp.), Common Knapweed (*Centaurea nigra*), Hogweed (*Heracleum sphondylium*) and Tufted Hair-grass (*Deschampsia cespitosa*).

Platanthera chlorantha (Greater Butterfly-orchid)

The plants are scattered along the west bank of the loch but in the southern part are more concentrated on the bank in the south-west near to the road. Flowering takes place 5 to 8 years after germination according to Summerhayes (1968, p. 3) who also states (p. 220) that fluctuations in numbers of flowering specimens appear to be due to locally favourable or unfavourable conditions. This appears to be the case for the south colony where in a dry June those flowers growing on shallow soils have been seen to wither. Particularly small numbers of flowering plants were recorded in the southern area for 1985 (Fig.3). Rainfall from April to August the previous year was unusually low as shown below.

Summer 1984

Rainfall in mm and as a percentage of the 1951-80 average

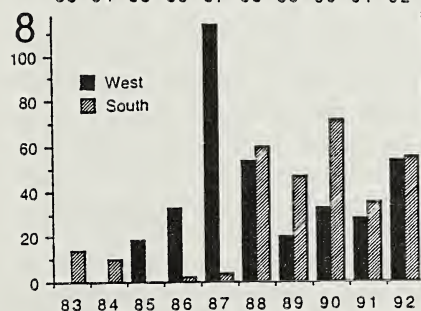
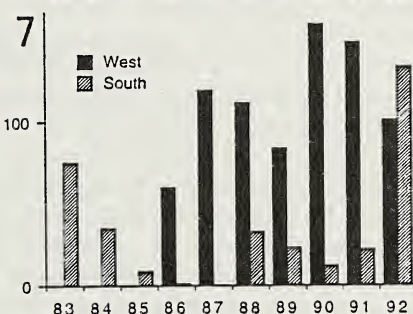
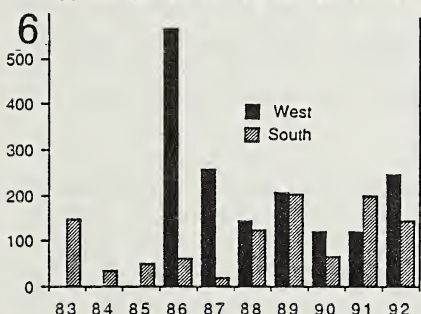
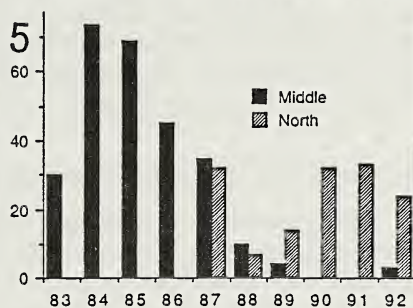
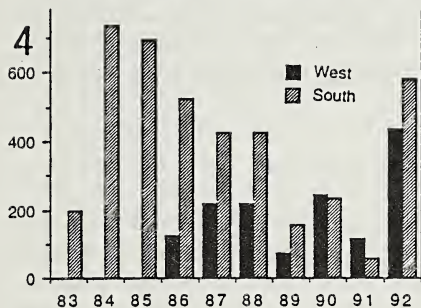
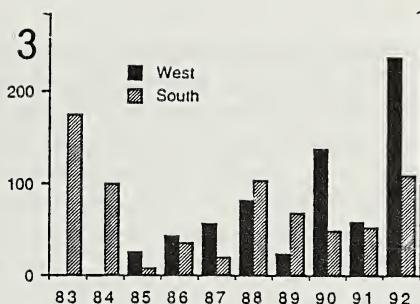
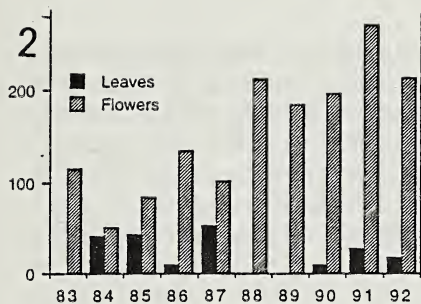
April	May	June	July	August
14	16	36	11	24mm
28	26	62	16	29%

On the west bank, where moister soils prevail, the plants seem unaffected by the drought and that population is possibly increasing.

Gymnadenia conopsea ssp. *borealis* (Fragrant Orchid)

This is the most common subspecies in northern Britain. The Dumbrock population is the largest Fragrant Orchid stand recorded in the Glasgow area. The plant produces an aerial stem in the third year after germination and is mainly monocarpic although some plants may flower a second or even a third time (Summerhayes 1968, pp. 14, 224). Summerhayes further states (p. 227) that "... the remarkable fluctuations in the number of plants seen in different years is not due to poor seed production, but to difficulties in the establishment of the seedlings and young plants in many seasons". The flowers are mainly lilac but some are magenta; all have a rich carnation-like perfume. This fragrance has also been noted in rare hybrids with *Dactylorhiza fuchsii* and *D. maculata*.

The first count, that for 1983 (Fig. 4) includes an area in the bowl where the then dense Bracken may well have concealed plants and



Figs. 2-8. Population counts of orchids at Dumbrook Loch meadows, 1983-1992.

2-*Listera ovata*, nos. of flowering and non-flowering plants.

3-8 nos. of flowering plants: 3-*Platanthera chlorantha*; 4-*Gymnadenia conopsea* ssp. *borealis*; 5-*Coeloglossum viride*; 6-*Dactylorhiza fuchsii*; 7-*D. maculata* ssp. *ericetorum*; 8-*D. purpurella*.

consequently the count may have been much too low. The south area counts, which are mainly from the bowl, show a steady decline from 1984-91 which may be due to the growth of Heather which replaced the Bracken in part. The apparent recovery in 1992 may relate to weather conditions in the preceding three or more years. Allan & Woods (1993, p. 76) suggest that the fluctuations in flowering of *ssp. borealis* from year to year is possibly due to changes in rainfall pattern. It is notable that the summer rainfall in the Glasgow area has shown considerable variation in monthly distribution pattern during the ten years of the survey. It seems then that factors affecting flowering are complex and information on the number of non-flowering plants is also needed to interpret the fluctuations in the numbers of flowering plants.

Coeloglossum viride (Frog Orchid) (Plate 5b p.348)

This small colony of Frog Orchids is the only one known to have survived in the Glasgow area; the orchid's requirement for short turf in established grassland on base-rich soil limits the number of suitable habitats. Summerhayes (1968, p. 211) states that the plant produces leaves two or three years after germination. There seems to be little published information on the plant's lifespan although Lang (1989, p. 81) notes "One plant which grew near Lewes in Sussex flowered every year from 1965 to 1972."

The 1983 count (Fig. 5) is of the minimum number of flowering plants. In subsequent years each flowering plant was marked by an adjacent black plastic label with its number scratched on, pushed partly into the ground. The plants were recorded from two areas; the left hand column refers to the "middle" of the west bank of the loch NS54937838 and right hand column towards the "north" end above rocks, centered on NS55007840, discovered in 1987. The numbers of flowering plants from the "middle" area began to decline from 1986 onwards and none was found in 1990 and 1991. This coincided with the growth of taller vegetation and invasion of Heather after the cessation of grazing. The turf in the "north" area is kept short partly by picnickers and fishermen and by a network of developing paths. The invasion of Heather and Knapweed in particular is controlled by handweeding. Although Summerhayes (1968, p. 212) states that "Fruits are set very rapidly and ripen as early as July", the Dumbrock plants do not usually begin to flower until July. The flowers can persist for a month or more and ripe capsules may not be produced until from mid September to mid October. In a wet autumn there may

be relatively little seed shed. The small labels (100 x 12mm) soon became obscured by coarsening vegetation and were only refound when the plant flowered again. Of the 184 plants in the "middle" area labelled from 1984 to 1992 only 40 flowered twice and 8 three times, not always in consecutive years. 128 plants flowered in the "north" area between 1987 and 1992, of these only 11 have flowered twice. In 1993 none of the 24 plants flowering in 1992 had flowered again.

Although 312 plants have flowered on the west bank of the loch during the 9 years of labelling individual plants only a small proportion seem to have flowered more than once. This is thought to be partly due to gradual loss of suitable habitat in the "middle" area, and to trampling, which probably damages the leaves as well as preventing fruiting, in the "north" area. This decline could also be related to poor autumn weather. The local meteorological records suggest that autumns are becoming wetter; this is later discussed. The very low numbers from 1988 and 89 could be related to this. It is hoped that a longer period of recording will clarify this possible correlation.

Dactylorhiza fuchsii (Common Spotted-orchid)

Experimental work by Leeson et al. (1991) suggests that *Dactylorhiza fuchsii* may reach the flowering stage 3 years from the time of seed germination. According to Summerhayes (1968, p. 272) there are records of the same clump of plants persisting and multiplying over a number of years.

The number graphed for 1983 is an estimate (Fig. 6). For 1984 the species was not separated from *D. maculata* and the number is half the total. As already discussed the two species are not always easily distinguished on floral characters and possible hybrids present a further problem. In the southern area numbers are generally higher from 1988-92. In the west the peak for 1986 is a striking one although numbers are fairly stable from 1987-92.

Dactylorhiza maculata ssp. *ericetorum* (Heath Spotted-orchid)

The development of *Dactylorhiza maculata* is similar to that of *D. fuchsii*. Population counts from Flanders (Hermý & Vanhecke 1989) based on an estimate in 1970 and 5 counts between 1981 and 1988 suggest a rise in the population, perhaps in response to mowing, which stabilised at some 60 flowering plants.

The same qualifications for 1983 and 1984 noted for *D. fuchsii* apply to *D. maculata*. There are more damp slightly-acid habitats at the western side of the loch than in the southern area and this is reflected in the number of flowering plants (Fig. 7) which show a generally stable population. The high number for the southern area in 1992 includes a newly found area in the south-west fen. A flourishing colony of *D. fuchsii* and *D. maculata* in a fen to the north-west of the wall was counted from 1989 to 1992 but these numbers have been omitted from Fig. 7.

Dactylorhiza purpurella (Northern Marsh-orchid)

There seems to be little published information on the life history of *Dactylorhiza purpurella*. Summerhayes in his preface (1968) notes that there are several examples of Marsh and Spotted Orchids flowering in about 4 years from seed.

In the early years of this survey the only plants of *D. purpurella* known in the southern area were widely scattered and probably under recorded (Fig. 8). In 1988 however, W. P. found a flourishing colony in the south west fen together with hybrids; the latter will be described and illustrated in a forthcoming paper. Plants on the west side of the loch, confined to the lower slope and the loch side recorded from 1985, were also accompanied by hybrids. The loch side and fen habitats have remained largely unaltered during the 10 years of this survey and both have fairly stable populations with the exception of a striking peak for 1987 for the loch side colony (Fig. 8).

Discussion

There are potential sources of inaccuracies in the counts. Where *Dactylorhiza fuchsii*, *D. maculata* and *D. purpurella* grow together there is inevitably hybridisation; Allan and Woods (1993, p. 94) state "... in many areas where they overlap, hybrid plants are far more common than the parents." Five different hybrids were recorded and are the subject of a forthcoming paper. Hybrids of *Dactylorhiza purpurella* with *D. fuchsii* or *D. maculata* showing hybrid vigour are most readily distinguished but plants lacking a robust habit, with usually rosy pink flowers intermediate between the parents may represent hybrid swarms resulting from hybridisation followed by back crossing as discussed by Lord and Richards (1977) for *D. fuchsii* x *D. purpurella*. With the resultant gradation in floral characters there is unlikely to be complete agreement between individual recorders as

to which plants are species and which hybrids.

Population studies are usually on rare species and consist of annual studies of individual plants, notably by Farrell (1991), Hutchings (1987a,b), Wells (1981) and Wells and Cox (1991) in Britain. However since studies of the more common orchids have only rarely been published in Britain it was decided that, in spite of shortcomings in the counting methods elaborated above, we would publish the results. Future work should give more accurate data on the orchids' life histories and so enable more effective conservation.

Wells (1981, p. 292) states "The factors which control flowering in herbaceous perennials are highly complex and little understood, and orchids are no exception." Long term studies have been made to attempt to deduce factors affecting flowering for several species of orchids rare in Britain. Individual plants of a species formerly thought to be monocarpic, *Ophrys apifera* (Bee Orchid), have flowered intermittently for at least 10 years (Wells & Cox, 1991). The development of inflorescences in the season preceding flowering has been recorded for *Dactylorhiza fuchsii* by Leeson et al. (1991); similar observations have been made for *Ophrys apifera* by Wells and Cox (1989). A wet spring and early summer has been correlated with flowering success for certain species although even temporary flooding may prevent flowering. It has also been shown that some species are vulnerable to drought conditions during the period of active growth, which may result in very low numbers flowering that year and the following. For long-lived *Listera ovata* flower frequency was higher during the period of rapid population growth than for an older relatively stable population (Tamm, 1991). Flowering of other species seems less affected by climate, although rainfall may affect the stature of the inflorescence (Hutchings 1987a).

Although all species recorded here show fluctuations in flowering numbers over the 10 year survey, most of the populations are essentially stable. An increase followed by stability for the last 5 years for *Listera ovata* is suggested. For *Platanthera chlorantha* fluctuations are probably due to drought in the south area but there is a possible increase in the west bank from 1985 to 92, the period when those counts were recorded. The decline in *Coeloglossum* due to habitat loss in the middle area is a striking one. The fairly stable population in the north area has had 2 very poor years; these may be correlated with wet autumns resulting in less seed being shed. The climate in the west of Scotland seems to be changing; in particular

autumn rainfall averages for both September and October between 1981 and 92 are 30 and 35mm higher respectively than those of the previous 30 years (1951-80). Future counts should indicate whether increasing rainfall is affecting the fruiting of the orchids. The populations of the Dactylorchids seem fairly stable with the exception of the peaks for *D. fuchsii* in 1986 and *D. purpurella* in 1987. It may be that potentially long-lived perennial orchids do not vary greatly in their flowering numbers from year to year unless drought affects their development at a critical stage. Those which flower only once or twice in a lifetime, as *Coeloglossum* appears to do at this site, and *Gymnadenia*, thought to be mainly monocarpic, seem to show the greatest variation in numbers, although loss of habitat is likely to be an important factor.

Management

As grassland is not a natural type of climax vegetation in Britain, meadows such as these cannot be maintained without management. Winter grazing, mowing, scrub clearance, the removal of herbaceous plants and even mosses have been used to maintain and increase orchid populations. (Farrell, 1991; Hermý & Vanhecke, 1989; Wells & Cox 1991). Winter grazing by cattle can cause compaction and erosion of shallow soils whereas sheep grazing has been found to produce a net increase in population size of a rare orchid, *Ophrys sphegodes* (Early Spider-orchid) (Waite & Hutchings, 1991). Unfortunately grazing has not been an option for the past ten years at this site. Mowing can 'help to control coarse vegetation if carried out before seeding. In Scotland, however seeds of later flowering orchids are not ripe until September or even mid October for *Coeloglossum*, by which time most invasive perennial plants have shed their seed. Furthermore these orchid-rich areas are also noted for their Lepidoptera; in particular *Zygaena filipendulae* (L.) (Six-spot Burnet moth), which is uncommon inland north of Glasgow, has a thriving colony by the loch side. Although the adults only survive until early August their eggs and caterpillars and their food plants, along with those of other Lepidoptera, are vulnerable to mowing until the adult stage. Because of these problems mowing and strimming has been largely restricted to maturing heather and coarse tussock-forming grasses.

It has become clear that hand pulling is the best option for the orchid-rich areas. By cutting and pulling, dense stands of mature Bracken have been reduced to a late weakly growth of fronds mainly

under 30cm tall, Annual cropping has been carried out before food reserves travel down to the rhizome, where this has been done more than once a year, the growth has been correspondingly weaker the following year. By 1987 the spread of Heather had become conspicuous. As some of the Heather is in the area of fruiting orchids, careful pulling in August when flowering makes it clearly visible has left the meadow species to seed normally. Knapweed is pulled up, also by the roots, at the same time. Such management must be annual; Heather has a large seed bank and Knapweed seeds blow in from surrounding areas.

Conclusion

What effect does this management have on the orchid population? The lack of grazing has almost certainly caused the virtual extinction of the Frog Orchid population at the middle of the west bank as the vegetation has become taller. In an area where Heather has not been culled, a former colony of Fragrant Orchid has almost gone. In other areas there is no clear evidence that the orchids are flowering less frequently. But as individual plants die are they being replaced by new ones here?

Future work

Following the advice of Scottish Natural Heritage, we are recording the lives of marked plants over a period of years; noting "births" and "deaths" as well as flowering and fruiting. Only by understanding the life histories can we hope to maintain their long term conservation.

Acknowledgments

Thanks are due to Mr P. Pickard, the landowner, who has generously allowed us to manage the SSSI. We are grateful for help, especially for recording for the last ten years, to Lonwen Edwards, Eve Gilmore and Monica Thorp. Without the hard work of many members of the Scottish Wildlife Trust (Allander & Kelvin Support Group) and others who have pulled Bracken, Heather and Knapweed there would be no orchid meadows. The SWT has generously provided financial support for Heather control. The staff of Mugdock Country Park have helped in various ways, especially with mowing and the help of their Conservation Volunteers. We wish particularly to

thank Jim Dickson for continuing support and helpful discussion and Dr Chris Sydes for his comments on the paper. The official weather statistics from Abbotsinch, Glasgow were made available by the Meteorological Office.

References

- ALLAN, B. & WOODS., P. 1993. *Wild Orchids of Scotland*. H.M.S.O. Edinburgh. 135 pages.
- FARRELL, L., 1991. Population changes and management of *Orchis militaris* at two sites in England. in: T.C.E. Wells & J.H. Willems (eds.), 63-68.
- HERMY, M. & VANHECKE, L., 1989. Orchids and nature management in Flanders: results of a mail questionnaire and a timely review of the situation. *Mem. Soc. Roy. Bot. Belg.* 11: 87-105.
- HUTCHINGS, M.J., 1987a. The population biology of the early Spider orchid, *Ophrys sphegodes* Mill. I. A demographic study from 1975 to 1984. *J. Ecol.* 75: 711-727.
- HUTCHINGS, M.J., 1987b. The population biology of the early Spider orchid, *Ophrys sphegodes* Mill. II. Temporal patterns in behaviour. *J. Ecol.* 75: 729-742.
- INGHE, O., & TAMM, C.O., 1988. Survival and flowering of perennial herbs. V. Patterns of flowering. *Oikos* 51: 203-219.
- LANG, D., 1989. *Orchids of Britain*. Oxford University Press. 233 pages.
- LEESON, E., HAYNES, C. & WELLS, T.C.E., 1991. Studies of the phenology and dry matter allocation of *Dactylorhiza fuchsii*. In: T.C.E. Wells & J.H. Willems (eds.), 123-138.
- LORD, R.M. & RICHARDS, A.J., 1977. A hybrid swarm between the diploid *Dactylorhiza fuchsii* (Druce) Soo and the tetraploid *D. purpurella* (T. & T.A. Steph.) Soo in Durham. *Watsonia*, 11, 3: 205-210.
- PRITCHARD, H.W., (ed.) 1989. *Modern methods in Orchid Conservation. The role of physiology, ecology and management*. Cambridge.
- SUMMERHAYES, V.S., 1968. *Wild Orchids of Britain*. 2nd ed. London.
- TAMM, C.O. 1991. Behaviour of some orchid populations in a changing environment: observations on permanent plots, 1943-1990. In: T.C.E. Wells & J.H. Willems (eds.), 1-13.
- WAITE, S. & HUTCHINGS, M.J., 1991. The effect of different management regimes on the population dynamics of *Ophrys sphegodes*: analysis and description using matrix models. In: T.C.E. Wells & J.H. Willems (eds.), 161-175.
- WELLS, T.C.E., 1981. Population ecology of terrestrial orchids. In: *The Biological Aspects of Rare Plant Conservation*, H. Synge (ed.), Wiley, Chichester. 558 pages.
- WELLS, T.C.E., & COX, R., 1989. Predicting the probability of the bee orchid (*Ophrys apifera*) flowering or remaining vegetative from the size and number of leaves. In: *Modern methods of orchid conservation: the role of physiology, ecology and management*, H.W. Pritchard (ed), Cambridge University Press, 127-139.
- WELLS, T.C.E., & COX, R., 1991. Demographic and Biological studies on *Ophrys apifera*: some results from a ten year study. In: T.C.E. Wells & J.H. Willems (eds.), 47-61.
- WELLS, T.C.E. & WILLEMS, J.H. (eds.) 1991. *Population ecology of terrestrial orchids*. S.P.B. Academic Publishing, The Hague. 189 pages.

Improving the Quality of poorly-pressed Herbarium Specimens

P. MACPHERSON

15 Lubnaig Road, Glasgow G43 2RY.

It is fairly generally known that before pressing a plant with submerged or floating divided leaves such as Water-crowfoots and Pondweeds it is advantageous to float it in water so that the leaves fan out. A sheet of plastic can then be inserted below and the specimen gradually lifted out, dried and mounted (Fig. 1).

A plant pressed and dried becomes brittle. Any attempt to open out a folded-over leaf will result in it cracking and breaking along the fold. I have discovered that by immersing a dried specimen in water for about half an hour, sufficient moisture is absorbed to restore a leaf's pliability so that it can be opened out and re-pressed.

I place most specimens into a dish containing water, but if only the lower part, or a single leaf, requires treatment, or if it is important to preserve the petals (which tend to crumple on removal from water) then I immerse the appropriate part of the plant in a vase of suitable size.

When pliability has been restored I find it best to lift the specimen out and place it on a clear plastic sheet (dye from a coloured sheet may be transferred to the wet foliage). Initially the stem is sellotaped to the plastic to anchor the specimen. The leaves are then progressively opened out and if necessary are held in place with stamp hinges. Sheets of absorbent kitchen towel are then placed over the specimen and pressure is applied by the equivalent of a telephone directory. If the stem is thick, small pieces of absorbent paper are placed over the leaves up to the level of the stem before applying overall layers. A refinement, to speed up the drying process, is to place a one way nappy liner between the specimen and the towel.

After 48 hours the specimen has dried and the plant persists in its new profile. The stamp hinges peel off easily and the tape can be removed from the stem without having caused damage. The specimen can then be re-mounted.



Fig. 1. Stream Water-crowfoot (*Ranunculus penicillatus* ssp. *pseudofluitans*): (a) plant with contracted leaves, (b) leaf which has been cut off and floated out before pressing ($\times \frac{2}{3}$).

Fig. 2. Parsley Water-dropwort (*Oenanthe lachenalii*): (a) initial pressing, (b) specimen after immersion in water, re-pressing and mounting ($\times \frac{1}{3}$).



Fig. 3. Hemlock Water-dropwort (*Oenanthe crocata*), a plant with mostly ovate-segmented pinnate leaves: (a) as collected and pressed in 1937, (b) after treatment and re-mounting in 1992 ($\times \frac{1}{2}$).

Fig. 4. Tuberous comfrey (*Symphytum tuberosum*), a plant with broad, lanceolate, entire leaves: (a) as pressed in 1937, (b) after treatment and re-mounting 56 years later ($\times \frac{2}{3}$).

The process can be applied to finely divided pinnate leaves (Fig. 2), to more broadly divided pinnate leaves (Fig. 3) as well as to undivided leaves (Fig. 4). It cannot however be effectively applied to a leaf which is already partially cracked or otherwise damaged.

To date, the oldest specimen on which I have performed this operation was 56 years old, having been collected in 1937 and treated in 1993 (Fig. 4).

Book Review

Wild Orchids of Scotland

BRIAN ALLAN and PATRICK WOODS with photography by
SIDNEY CLARKE

HMSO Edinburgh, 1993, 135 pp., many colour plates. Hardback,
ISBN 0 11 494246 3, £24.95.

The superb colour plates, many of them 22 x 13cm or more wide, immediately attract the eye in this large format book. The orchids are reproduced larger than life size, though no scale is given, with colour variants and close-ups as smaller photographs. The colour reproduction is of a high standard as are the drawings by Mary Bates.

Orchid biology and a glossary are clarified by large scale drawings, there is a chapter on orchid habitats and conservation and a reading list. Sidney Clarke generously gives information about the equipment he uses to obtain his beautifully sharp photographs. Each of the 28 species described has a double page spread with good descriptions, habitat details and distributions. Habitat photos range from orchid-rich meadows to spoil heaps. Maps based on vice-county distributions are given but unfortunately some of these for pre-1970 are inaccurate. For instance the 1962 edition of the *Atlas of the British Flora* (ed. Perring & Walters) shows records for *Dactylorhiza maculata* for all the Scottish V.C.s whereas Orkney and several of the Western Isles are shown as blanks. There is a discussion on hybridisation and the problem of identifying hybrids, especially of the *Dactylorhizas* and it is acknowledged that hybrid plants may be more common than the parents. For those buying the key separately, it is regrettable that there is only a passing mention of hybrids at the beginning of the key (*Field Key to Wild Orchids of Scotland* by Patrick Woods & Mary Bates, HMSO £1.95). The key has good drawings of the subtle differences separating some closely related species. The numbering of the drawings is confusing as numbers refer to stages in the key and not to the numbers given to the species. The book should succeed in its aims as set out in the foreword "... to contribute to the conservation of our Scottish orchids by making their identification easier, the biology and ecology more widely understood and the intricate beauty of their flowers more readily appreciated."

CAMILLA DICKSON

The Inchlonaig Yews, their Tree Epiphytes, and their Tree Partners

N. PILKINGTON, J. PROCTOR and K.I. REID

Department of Biological and Molecular Sciences,
University of Stirling, FK9 4LA

Inchlonaig, a 74.8ha island in Loch Lomond is nationally known for its large population of Yew trees (*Taxus baccata*). These were described by Mitchell (1974) who suggested from the historical evidence that they probably originated from a fourteenth century plantation. The age of the present trees is unknown but some must date from a re-planting which took place after 1828 or 1829 when Inchlonaig was visited by Lord Teignmouth (J.M. Mitchell personal communication). Teignmouth (1836) recorded that Inchlonaig had 'been unfortunately stripped of the fine yew which once covered it' and that 'A few trees have been spared, scorched, and reddened by the conflagration which consumed the rest'.

A previously undescribed feature of the Inchlonaig Yews is that they are hosts to a large number of vascular epiphytes and most Yews on the island have some species of fern or flowering plant on their branches. Blaeberry (*Vaccinium myrtillus*, Broad Buckler Fern (*Dryopteris dilatata* and Wood Sorrel (*Oxalis acetosella*) are among the commoner epiphytic species but there are also trees, Birch (*Betula pubescens* ssp. *carpatica*), Holly (*Ilex aquifolium*), and Rowan (*Sorbus aucuparia*) which occur as Yew epiphytes. In some cases (of which the first was noted in 1974) there are trees which are entirely enveloped by the bark of the Yew (Fig. 1) and which raise the question of the nature of the dual-tree relationship between them and the Yews.

In this paper we report on a survey of the Yew trees on Inchlonaig and of their tree epiphytes and of the Yews which have formed dual trees. We also report studies of chemical analyses which were made on the leaves of free-living, epiphytic, and dual-tree-partner Birch, Holly and Rowan to try to elucidate their relationship with host Yews. Finally, we report growth-ring width estimates from free-living and dual-tree-partner Rowan (partner Birch and Holly were too small or infrequent to be studied) which were made to see if the Yew connection resulted



Fig. 1 A small Rowan forming a dual tree with Yew.

in slower growth rates.

The plant names in this paper are from Kent (1992).

Materials and Methods

The Survey

The Yew trees were surveyed in August and September 1991 by systematically walking on compass bearings across the island. An organic-based (readily decomposable) string was tied round each tree to avoid counting the same individual twice. Each Yew was scored for the presence of epiphytic Birch, Holly or Rowan or if it was involved in a dual relationship with one of these species. The height of every Yew was

estimated by eye to the nearest half metre and where there was a dual relationship, the height of the partner (above its base on the Yew branch) was also estimated. The Yews were sexed by scoring those with 'berries' (arillate female cones). Trees without berries were assumed to be male. Trees with iron guards (relics of protection against grazing for Yews planted in the nineteenth century) were scored for the presence of this feature.

Chemical analysis

Mature undamaged leaves were collected between 1 and 7 August 1991 from: six free-living Birch, three epiphytes, and three partners; five free-living Holly, three epiphytes, and four partners; and ten free-living Rowan, five epiphytes, and five partners. About 0.5g of leaf material was digested in a mixture of 6ml concentrated sulphuric acid (containing 0.1% selenium) and 3ml of '100 volume' hydrogen peroxide solution. Potassium and sodium were analysed by emission spectroscopy and calcium and magnesium by atomic absorption.

Annual growth ring width

Nine free-living and seven partner Rowans were cored using a Pressler borer (of 10cm length). The cores were not always taken to the centre of the tree because of difficulty in removing the borer. The diameter of each tree used for coring was measured. The sampled free-living Rowans had their diameters measured at breast height (1.3m), partner Rowans had their diameters measured at 50cm from where they emerged from the Yew branch. Annual growth rings were measured on cores which had been smoothed and stained with a mixture of hydrochloric acid and phloroglucinol.

Results

Tree enumeration

A total of 791 Yews were counted and their distribution is shown in Fig. 2. Of these 378 (47.8%) were female and 413 (52.2%) were male. The heights ranged from 2 to 15m with a mean of 8.6m. The numbers of tree epiphytes and those which occur as partners are given in Table 1 and their distribution is shown in Fig. 3. Most of the tree epiphytes and partners were Rowans with smaller numbers of Birch and Holly. There were 32 female and 28 male Yews with epiphytic trees. Three of the Yews had two individuals of the same tree epiphyte species. Two

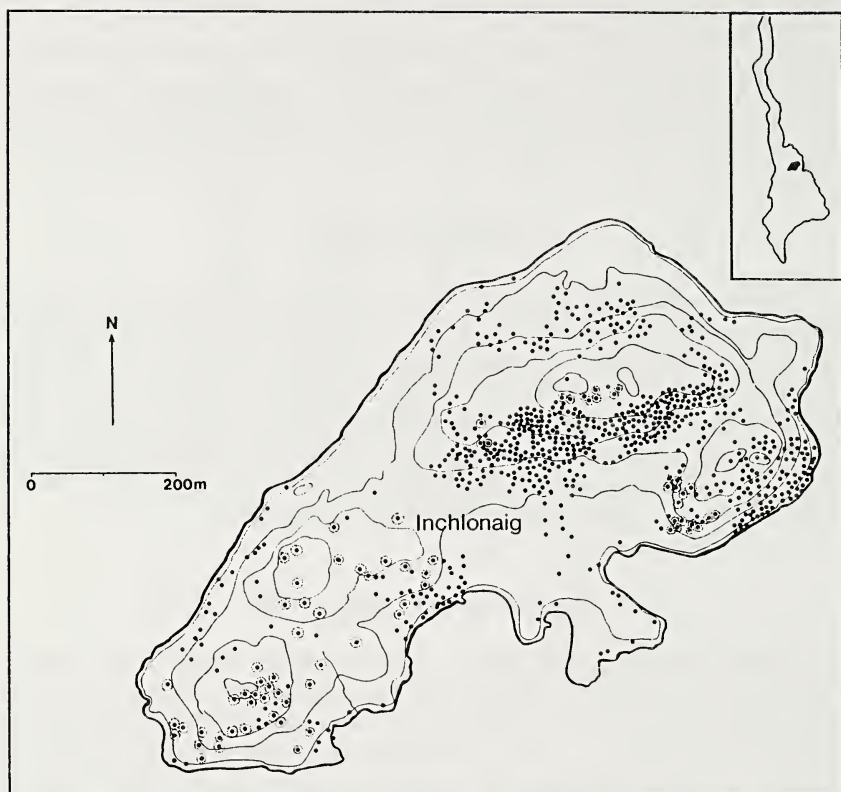


Fig. 2. The distribution of Yew trees on Inchlonaig: those with remaining nineteenth century guards are ringed. Insert: Loch Lomond showing position of Inchlonaig.

Yews had epiphytic Birch and Rowan, and a further two had an epiphytic Holly and Rowan. Fifteen female and 13 male Yews were host to dual tree partners. There was never more than one partner per Yew tree.

The epiphytic trees were small (mean height 1.0m) and occurred at all heights on the Yews. The partners were up to 9m high from where they emerged from the Yew branch and ranged in diameter from about 2cm to 32cm. Most emerged on branches at least 4m from the ground but the larger ('10cm diameter) partners usually occurred below 2m on the Yew. The epiphytes and dual trees are scattered all over the island. There was only one example of a dual tree where the Yew had an iron-guard, which suggests that the dual trees are developed from older Yews (which possibly pre-date the 19th century fire) since the trees with guards

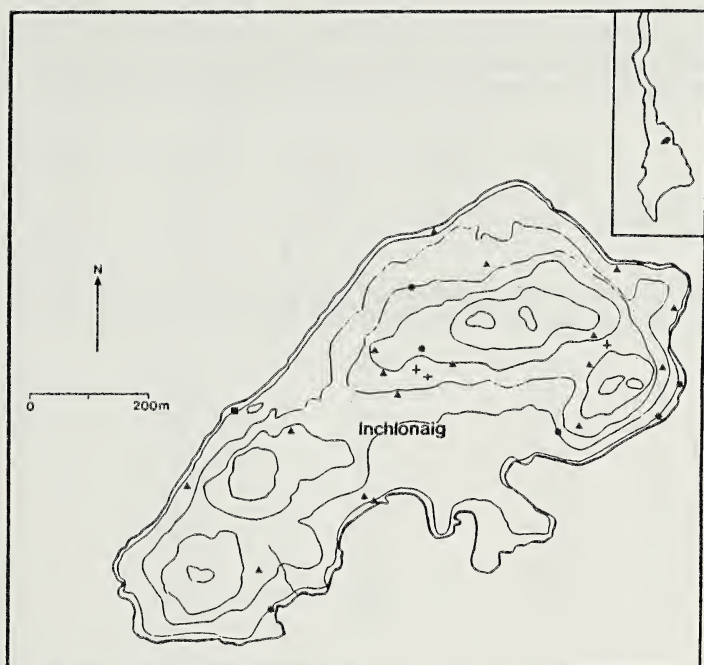


Fig. 3. The distribution of dual trees on Inchlonaig: ▲ Yew with Rowan; ● Yew with Holly; + Yew with Birch; and ■ Birch with Rowan.

were younger, single-stemmed and had less sites open for colonization.

Foliar chemistry

Foliar element concentrations were similar between free-living and epiphytic individuals except for magnesium in Rowan ($p = 0.01$) and potassium in Holly ($p = 0.04$) which were significantly higher and calcium in Holly ($p = 0.04$) which was significantly lower in the epiphytes. For the dual trees, only the higher magnesium concentrations in Rowan ($p = 0.04$) were significantly different from the values in the free-living individuals.

Annual growth rings

The free-living Rowans had a mean annual growth ring width of 1.69mm, the partners had growth rings with a mean annual width of 1.95mm. The difference between the means was not statistically significant. The minimum age of the partner Rowans was about 20 years, others were much older (up to 75 years) — and as old as the older free-standing Rowans investigated.

Table 1. The numbers and mean heights of epiphytic Birch, Holly and Rowan and the numbers and mean heights of these species which are partners in a dual tree with Yew. Heights were measured from the branch where the epiphyte or partner grew.

	Epiphytes			Partners		
	Birch	Holly	Rowan	Birch	Holly	Rowan
Tree nos.	6	6	52	3	6	17
Mean height (m)	1.0	1.0	1.0	4.4	5.8	7.2

Table 2. Mean element concentrations (mg g⁻¹) in leaves of (a) free-living, (b) epiphytic, and (c) partner Birch, Holly and Rowan.

		K	Na	Ca	Mg
Birch	(a)	3.41	1.23	2.23	0.83
	(b)	4.53	1.47	2.78	0.78
	(c)	3.33	1.75	2.99	1.01
Holly	(a)	5.98	3.80	2.59	1.16
	(b)	10.3	4.38	1.64	1.18
	(c)	7.49	5.43	2.41	1.04
Rowan	(a)	5.45	1.16	2.44	1.37
	(b)	7.90	1.74	2.95	2.18
	(c)	7.91	1.53	2.56	1.65

Discussion

The origin of the dual trees

The most likely origin of the dual trees is that they begin as an epiphyte and host. The epiphyte sends roots through a hole in the Yew and if the trunk is continuously hollow then the epiphyte roots reach the ground. The Yew bark then grows round the base of the epiphyte and the dual tree is initiated. This idea of the origin of the dual tree is supported by observations of three cases where the trunk of the Yew partner has split open to reveal a hollow interior. The root system of the Rowan partner could then be clearly seen going into the ground as is shown by the example in Fig. 4. Conservation considerations precluded the sawing and detailed examination of the union in the dual trees. It seems highly unlikely that a true graft has formed.

Yew seems to be adept at enveloping objects with its bark. Some of the railings of the 19th century iron guards are now embedded in the trees. Occasionally Yews were observed with their branches embedded in the bark of other branches of the same tree.

The similarity of the foliar nutrient concentrations supports the view that the dual trees are independently rooted and that at least some of



Fig. 4 A larger Rowan forming a dual tree with Yew. The Yew bole has split open to reveal the Rowan roots within.

the roots of the erstwhile epiphytes extract nutrients from the soil. The differences between foliar nutrient concentrations in epiphytic and free-standing Birch, Holly and Rowan are greater than those between the latter and the dual tree partners. This would be expected since the epiphytes are not rooted in the soil.

The similarity of the annual growth ring width between the free-living and partner Rowans supports the view that the partners are at least partly rooted in the same soil. It also shows that the partner habit is not deleterious as far as vegetative growth is concerned which is surprising in view of the shade cast by the Yew foliage. A few of the larger partner Rowans were observed to be fruiting. In the case of Holly a fairly high proportion of the trees are on Yews. Thirteen Holly trees were observed growing epiphytically or as partners. Free-standing Holly individuals are rare on the island and were often near but not on Yews and inside the iron guards. It is likely that the epiphytic or dual-tree habit confers advantages in protection from browsing and grazing.

Dual and epiphytic trees elsewhere

Birch, Holly and Rowan epiphytes have been recorded on a variety of species but not on Yew (Kelly 1981; Rose 1974). Kelly (1981) regarded Rowan as a very moisture-loving species which can thrive as an epiphyte in a high humidity environment. He also claimed that Yew was generally unsuitable for epiphytes because it has smooth flaking bark. Wilks (1972) however has observed Oak (*Quercus* sp.) growing epiphytically on Yew.

Dual trees are very poorly documented. During the present survey a Birch with a Rowan partner on it was observed (Fig. 3) and more such dual trees not involving Yew as a partner may exist on Inchlonaig. Wilks (1972, p. 208) mentions trees living on each other, giving specific examples such as Hawthorns 'encased in Oak shells, passing through holes in the outer bark'. He also mentions that other common variations are Rowan on Willow, Birch on Elm, and Oak on Yew. He describes a spectacular example, near the Woodrow Inn at Cawston, Norfolk which is part Beech, part Hornbeam and part Oak, with leaves of each species on every branch. The situations described by Wilks are almost certainly similar to these we have described for Inchlonaig.

A request in 1991 in the *British Ecological Society Bulletin* for records of dual trees elsewhere produced several replies but most described what were apparently epiphytes. Two described dual trees however. The first was a Yew which has a large Rhododendron

(*Rhododendron ponticum*) and Ash (*Fraxinus excelsior*) on it in the grounds of Slebech House in South West Wales (A. Agnew, personal communication 1991). The other was of trees (species not recorded) growing on *Eucalyptus* in Australia (M. Andrew, personal communication).

An intriguing dual tree record was made by P. Wormell (personal communication) near the Black Lochs at Clais Dhearg, about 2.5km south-east of Connel, Argyll. Here there was a Rowan on to which a Hawthorn (*Crataegus monogyna*) had grafted itself. This was apparently a true graft (this would be likely since Rowan and Hawthorn are in the same plant family, the Rosaceae) but unfortunately this dual tree has now disappeared.

Conclusions

Inchlonaig (Gaelic Island of Marshes) has a high humidity which favours the high abundance of epiphytism. The tree vascular epiphytes on Yew in particular, can develop into partners in a dual tree situation because of the enveloping tendencies of Yew bark and the propensity of older Yews to become hollow. The Yew epiphytes and especially the dual trees, are an unusual feature and add to the conservation interest of the island.

Acknowledgments

Mr J. Mitchell is thanked for his comments on the manuscript.

References

- KELLY, D. L., 1981. The native forest vegetation of Killarney, S.W. Ireland: an ecological study. *J. Ecol.* 69: 437-472.
- KENT, D. H., 1992. *List of Vascular Plants of the British Isles*. B.S.B.I., London.
- MITCHELL, J., 1974. The Yew trees of Inchlonaig, Dunbartonshire. *Trans. Bot. Soc. Edinb.* 42: 163-166.
- ROSE, R., 1974. The epiphytes of Oak. In *The British Oak, its History and Natural History*. (Ed. M. G. Morris and F. H. Perring), pp 250-273. B.S.B.I., London.
- TEIGNMOUTH, Lord, 1836. *Sketches of the Coasts and Islands of Scotland and of the Isle of Man*. Volume 2, J. W. Parker, London.
- WILKS, J. H., 1972. *Trees of the British Isles in History and Legend*. F. Muller Ltd., London.

Book Review

Eric Hosking's *Classic Birds* — 60 Years of Bird Photography

JIM FLEGG and DAVID HOSKING

Harper Collins, London, 1993, 190pp, 160 black and white photographs, ISBN 0 00 219975 0, £16.99.

Having been inspired by the photographic work of the late Eric Hosking in my boyhood days, I find it somewhat difficult to be totally objective about this book.

Eric Hosking was one of the first people to make bird photography a professional occupation. His stunning bird portraits are to be found in nearly every natural history book published from the 1940s to the 1980s. He was a pioneer in many aspects of natural history photography. He pioneered the use of photographic hides for nest work, the use of flashbulbs to capture nocturnal birds and latterly he experimented with high-speed electronic flash to record birds in full flight — the results of which revealed new information about the mechanics of bird-flight. His world famous flight pictures, such as those of the Barn Owl, are known to everyone interested in birds or photography. The camera equipment used by Eric is covered in the last chapter. By today's standards, it was crude and cumbersome but he was a skilled photographer/naturalist and produced a quality of photograph which hitherto had been unattainable.

This book is a tribute to Eric Hosking's photographic accomplishments, with additional information extracted from his field notes and supplemented by the personal recollections of his son David. Charming observations by Jim Flegg, Eric's lifelong friend, are included with the subjects portrayed. Detailed technical information accompanies each illustration and many interesting facts come to light. I was amazed to learn that the classic series of superb pictures of a Greenshank removing eggshells from its nest was taken with *one* second exposures — usually a recipe for disaster! His apparent disregard for personal safety is illustrated by the precarious nature of some of the pylon hides from which he photographed tree-nesting birds. The loss of an eye in an attack by an Owl early in his career did not diminish his enthusiasm for his art.

The high quality of reproduction in the book does great justice to the photographs, many of which I collected as a boy, and this publication is a must for enthusiasts of Eric Hosking's outstanding bird pictures. However, it should be said that the lack of colour photographs diminishes the overall impact of the book and makes it somewhat overpriced.

T. NORMAN TAIT

Dental loss, Disease and Abnormalities in Scottish Red Foxes

M. HANCOX

17 Nouncells Cross, Stroud, Glos., GL5 1PT

The dental formula of the Red Fox, *Vulpes vulpes* (L.) – incisors 3/3, canines 1/1, premolars 4/4 and molars 2/3 – shows the basic tooth complement of a heterodont placental mammal, except that one upper molar has been lost (Fig. 1). Carnivory is indicated by the carnassial shearing role of the 4th upper premolar and the first lower molar.

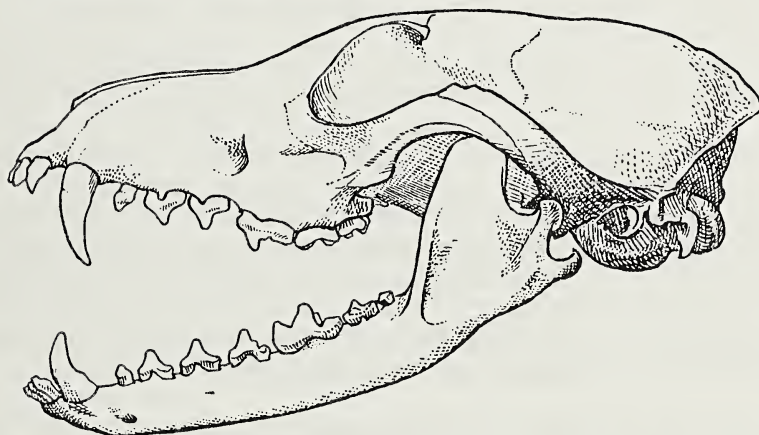
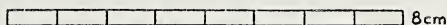


Fig. 1. Skull of fox. Reproduced from *The Handbook of British Mammals*, 1964, by permission of Blackwell Scientific Publications.

Surprisingly few studies of dental anomalies or disease in foxes have been made either in Scotland (Ratcliffe, 1970) or elsewhere in western Europe (Bree, 1969; Lups, 1972; Rantanen, 1970; Reinwaldt, 1963). Clearly, such studies are of interest in relation to possible effects on foraging ability and longevity.

In the work reported here, the crania of 747 foxes, accumulated by

the Department of Agriculture and Fisheries for Scotland from throughout Scotland, were examined for dental anomalies. All crania had attained the adult permanent dentition. Mandibles associated with the crania of 21 of these foxes were also examined.

Results and discussion

Supernumerary teeth may occur among all tooth types (Colyer, 1936; Lloyd, 1980) but, amongst the present crania, only one fox had a supernumerary left 4th incisor and only one had a right 1st incisor missing for which there was no gap in the tooth row. However 111 crania (14.86%) exhibited a loss of one or more teeth during life, with at least partial healing of the alveolus (socket) (Table 1).

Table 1. Tooth loss in Scottish fox crania

Tooth	Incisors			Canines	Premolars				Molars	
	1	2	3		1	2	3	4	1	2
No. of cases lost	77	28	11	16	31	13	8	12	4	4
No. of cases lost as % of total	38	14	5	8	15	6	4	6	2	2

Clearly, as observed elsewhere, the smaller anterior premolars and incisors were the teeth most easily damaged and lost, even though foxes and other canids do not show the tooth reduction series with consequent loss of vestigial teeth exhibited by badgers and other mustelids (Hancox, 1988a, 1988b). Foxes accordingly show a lower overall tooth loss: 204 lost from a total of 14940 cranial teeth, i.e. 1.36%. Most teeth were lost outright, but in a small minority of cases larger teeth showed damage: e.g. premolars were chipped or the tips of canines were lost.

In the vast majority of instances tooth loss and healing over the alveolus occurred without disease setting in, even where canines had been lost. Where the broken-off stumps of smaller teeth remained in the alveolus, virtually all of these would have been below gum level in life and, as in badgers, there would probably have been little effect on foraging ability. However in the minority of cases where disease, accompanied by bone erosion or swelling, followed tooth loss or damage, impaired foraging ability, as reported in British (Lloyd, 1980) and Finnish (Rantanen, 1970) studies, may have resulted. Also, as in badgers, abscesses may have led to the premature deaths of a few individuals.

In six crania canine loss was accompanied by a dental abscess. In four of these the tooth was merely broken off, whilst in four cases there

was swelling or osteomyelitis externally on the maxilla over the root, and even perforation in two cases. Osteomyelitis with an incipient abscess occurred in two cases involving premolars 3-4 and in several cases involving molars 1-2. Four crania had abscesses in the palate near premolars 1-3, perhaps caused initially by infection of the soft palate where it had been damaged by bone splinters.

The incidence of dental abscesses, only 11 cases, ie. 1.3%, contrasts with that found in badgers where some 1% of skulls had major abscesses and up to 6% had minor ones. However, foraging techniques are more likely to damage teeth in badgers and their populations may not suffer juvenile mortality and rapid turnover to the same extent as do fox populations. Also, a study of 470 badger skulls from south-west England, where tuberculosis is prevalent in the population, suggests that some of the disease damage observed (periodontitis, periostitis and superficial acropachia) may well have been of tubercular origin (Hancox, 1992).

Other dental abnormalities and variations exhibited amongst the crania were comparable to those found in other studies of fox and badger material. Dental caries were very scarce, with only one case in a worn molar, since, as observed in Finland (Rantanen, 1970), dentine is seldom exposed by wear. Incomplete emergence was noted in one canine.

Great variation occurred in the size and spacing of teeth, particularly in that of the premolars, where the 3rd upper ones ranged from being 'in alignment' with the long axis of the maxilla, to being at a considerable angle to it to 'fit in'. Similarly the 1st upper premolar was occasionally almost two rooted. Scottish fox material is especially variable due to introductions from the continent. Premolar size, degree of cramping and root number also varies greatly in badgers, especially in relation to geographical race.

Amongst the 21 sets of mandibles, associated with crania, one showed incomplete emergence of a canine and ten, out of the potential total of 42 third molars, had been lost in life. These were vestigial teeth as noted also by Lloyd (1980).

Acknowledgment

I am especially grateful to Dr H. Kolb, for access to the Scottish fox material from the Department of Agriculture and Fisheries for Scotland.

References

- BREE, P.J.H. van, SINKELDAM, E.J., 1969. Anomalies in the dentition of the fox from continental western Europe. *Bijdragen tot de dierkunde* 39: 3-5.
- COLYER, F., 1936. *Variations and diseases of the teeth of animals*. Bale, London.
- HANCOX, M., 1988. Dental loss, disease or abnormalities as a mortality factor in the Eurasian badger. *Acta Theriologica* 33: 575-9.
- HANCOX, M., 1988. Dental anomalies in the Eurasian badger. *J. Zool. Lond.* 216: 606-8.
- HANCOX, M. 1992. *Badgers and bovine TB. Small Carnivore Conservation* 7:14, *ibid.* 6:18, 9:21.
- LLOYD, H.G., 1980. *The Red Fox*. Batsford, Lond.
- LUPS, P., NEUENSCHWANDER, A., WANDELER, A., 1972. Gebissentwicklung und Gebissanomalien bei Fuchsen. *Rev. Suisse Zool.* 79: 1090-1103.
- RANTANEN, A.V., PULLIANEN, E., 1970. Dental conditions of wild red foxes in north eastern Lapland. *Ann. Zool. Fennic.* 7: 290-4.
- RATCLIFFE, P., 1970. The occurrence of vestigial teeth in badger, roe deer and fox from the county of Argyll, Scotland. *J. Zool. Lond.* 162: 521-5.
- REINWALDT, E., 1963. Ueber einige anomalien im gebiss des Rotfuchses. *Arkiv Zool. Pl.S.* 15: 371-5.

Book Review

Collins Field Guide: Birds of Britain and Europe, New Ed.

R. T. PETERSON, G. MOUNTFORD and P. A. D. HOLLAM
Harper Collins, London, 1993, 320 pp., many colour illustrations
and maps. Hardback, ISBN 0 00 219900 9, £14.99.

There can be few bird watchers these days who have not cut their teeth on the Peterson field guide. This is the fifth edition of a book which has sold probably millions of copies (I have copies of the past four editions). The new edition has new plates, more modern maps and illustrates many more species. The descriptions of "accidentals" has also vastly increased and is more-or-less up to date.

While the ultimate field guide, covering all plumages, ages and sexes has yet to be written, this book will continue to be among the most frequently consulted by amateur and expert alike.

The Hardback version is well bound and will probably take a fair amount of abuse before falling apart. The information and plates alone make this book good value. Every bird-watcher should have this edition.

BERNARD ZONFRILLO

Bovine Tuberculosis and Scottish Wildlife

M. HANCOX

17 Nouncells Cross, Stroud, Glos., GL5 1PT

The possibility that bovine tuberculosis (TB) in wildlife might be a source of infection to domestic stock such as cattle or farmed deer has been a hotly debated issue for years. The problem in British cattle has been confined largely to the four English counties of Avon, Cornwall, Devon and Gloucestershire, probably due to a combination of the intensive stocking and mild wet climate in these parts. However, there have been recent scare stories in the press of spread to other areas including Scotland.

It is important first of all to get the whole problem into perspective. Out of some 22,000 herds throughout the south-west of England there have been each year around 100 herd outbreaks involving only 600-700 infected cattle. Also, for twenty years the incidence has fluctuated slightly in relation to total summer rainfall and bacillus survival (Hancox, 1988; MAFF, 1976-93).

A recently reported modest upswing and spread to 'new' areas such as Somerset and Gwent (Booth, 1993) may be due to a new factor. Since 1986 some 107,000 cattle have had to be replaced as a result of mad cow disease (BSE: bovine spongiform encephalopathy). The skin test for cattle may miss at least 5% of TB carriers, which could account for the upswing and could also explain why there has been no corresponding increase in the incidence of TB in badgers (Hancox, 1993a, b). In fact there is good evidence that transfer of TB *from cattle to badgers* rather than *vice versa* has been occurring all along. Badgers initially acquire TB by dietary routes such as eating dung beetles from infected cow pats (which may remain infectious for up to a year) (Hancox, 1993a, b). Cattle TB is essentially respiratory and does not result from grazing even heavily contaminated pasture (Francis, 1947; Benham, 1991; Hancox, 1993a, b).

With regard to TB of the bovine strain in Scottish wildlife, only

one case of TB in a native badger has been reported (from the Lothians in 1990: MAFF, pers. comm.). A second, preserved specimen in the Royal Scottish Museum, Edinburgh, came originally from Whipsnade Zoo in 1955 (A. Kitchener, pers. comm.). Scottish deer appear to be totally unaffected by bovine TB, despite a very large sample size examined, with the exception of one roe deer in 1989 in Inverness-shire (MAFF, pers. comm.).

It is likely that these odd wildlife cases stem from cattle contacts. An at first sight more worrying case of TB in farmed red deer in Kirkcudbrightshire was shown to be due to imports of deer from England, which in turn were traced to deer brought in from eastern Europe (MacNally, 1989).

Thus, whilst there is no room for complacency and the situation needs to be monitored continuously, there is no evidence as yet that bovine TB has spread through Scottish wildlife to any significant extent.

References

- BENHAM, P. J. F., 1991. Transmission of bovine TB. *Brit Vet. J.* 147: 528-531.
 BOOTH, S., 1993. *Bovine tuberculosis in the southwest*. Unpubl. report, National Farmers Union, Exeter.
 FRANCIS, J., 1947. *Bovine tuberculosis*. Staples Press, London.
 HANCOX, M., 1988. Bovine TB and drought. *Vet. Rec.* 122: 214.
 HANCOX, M., 1993a. Badgers and bovine TB. *School Science Rev.* 74: 130-131.
 HANCOX, M., 1993b. Badgers and bovine TB. *Ecologist* 23: 159-160.
 MACNALLY, L., 1989. Gloom and doom. *Shooting Times and Country Mag.* April 6-12: 16.
 MAFF (Ministry of Agriculture, Fisheries and Food), 1976-1993. Bovine tuberculosis in badgers. *Annual Reports 1-16*. H.M.S.O., London.

Insect Records from the West of Scotland in 1992

Compiled by E. G. HANCOCK

Art Gallery and Museum, Kelvingrove, Glasgow
G3 8AG.

In this list of records, specific names and reference numbers of Lepidoptera are as in Bradley, J. D. and Fletcher, D. S., 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*, Curwen Books, London. As entries are numbered, family names have been omitted. Other insects are as in Kloet, G. S. and Hincks, W. D., 1964 (Small Orders and Hemiptera); 1976 (Diptera and Siphonaptera) and 1977 (Coleoptera and Strepsiptera).

A noticeable feature of this year's records was the extraordinary migration of Lepidoptera which commenced on 14th May.

ORTHOPTERA

TETRIGIDAE

Tetrix undulata (Sowerby). Nr, Arnprior, Stirlingshire, V.C.86, 15/6/92, EGH.

ODONATA

LIBELLULIDAE

Libellula quadrimaculata L. Loch Ard, Stirlingshire, V.C.86, 19/6/92, EGH.

NEUROPTERA

CHRYSOPIDAE

Chrysopa perla (L.). Cander Moss, Lanarkshire, V.C.77, 16/8/92, EGH.

SYSYRIDAE

Sisyra fuscata (Fabr.). Loch Shiel, Argyll, V.C.97, 3/7/92, EGH.

LEPIDOPTERA

56. *Stigmella dryadella* (Hofm.). Mines in *Dryas*, Glasnock (NG8644), V.C.105, 23/6/92, (PWB); Mines in *Dryas*, Aonach Beag, Beinn Alder (NN4775), V.C.97, 2/7/92, KPB.

109. *Stigmella prunetorum* (Stt.). Mines in *Prunus spinosus*, N.W. of Lanark (NS8744), V.C.77, 5/9/92, KPB & RKJ, NEW TO SCOTLAND

149. *Adela cuprella* (D. & S.). Ae Forest (NX9893), V.C.72, 16/5/92, KPB.

169. *Zygaena filipendulae* (L.). Balgray Reservoir, V.C.76, 20/6/92, JC; South Pollok Recreation Ground, V.C.76, 1/7/92, JHD, over 50 individuals seen; Auldhouse Burn, V.C.76, 11/7/92, SJE; Dougalston Golfcourse, V.C.86, 11/7/92, JK; New Cumnock, V.C.75, July 1992, MJ; Dumbrock Loch, Mugdock, V.C.86, 24/6/92, JM,

Glasg. Nat. 22 part 4 (1994)

where it has been known to have occurred for several previous years; Bernera, Lismore, V.C.98, 20/6/92, AMS; Hunterston, Ayrshire, V.C.75, 10/8/92, AMS & AR, empty pupal case on grass stem.

356. *Phyllonorycter tristrigella* (Haw.). Blisters on *Ulmus*, N.W. of Lanark (NS8744), V.C.77, 5/9/92, KPB & RKJ.

413. *Argyresthia sorbiella* (Treit.). Resipole (NM7264), V.C.97, 4/7/92, KPB.

474. *Acrolepiopsis betulella* (Curt.). Reared from *Allium ursinum* from Resipole (NM7264) V.C.97, 4/7/92, KPB.

485. *Schreckensteinia festaliella* (Huebner). Reared from larvae on *Rubus saxatilis* from Resipole (NM7264), V.C.97, 4/7/92, KPB.

496. *Coleophora milvipennis* Zell. Cases on *Betula pubescens* at Resipole (NM7264), V.C.97, 4/7/92; Glenfinnan (NM9179), V.C.97, 5/7/92, KPB.

546. *Coleophora genistae* Stt. Cases on *Genista anglica* at Loch Ba, Rannoch Moor (NN3049) V.C.98, 5/7/92, KPB.

760. *Exoteleia dodecella* (L.). To light at Ae Forest (NX9893), V.C.72, 13-14/6/92, KPB.

1141. *Epinotia nemorivaga* (Tengs.). Workings on *Arctostaphylos* at Kentra Moss (NM6668), V.C.97, 4/7/92, KPB.

1315. *Catoptria furcatellus* (Zett.). Aonach Beag, Beinn Alder (NN4775), V.C.97, 2/7/92, KPB.

1335 *Scoparia ulmella* Knaggs. Ae Forest (NX9893) V.C.72, 26/7/92, KPB.

1516. *Pselnophorus heterodactyla* (Müll.). Larvae on *Crepis paludosa* at Corra Linn, Falls of Clyde, (NS8841), V.C.77, 5/9/92, RKJ, third Scottish locality.

1545. *Colias croceus* Geoffroy, Clouded Yellow. Earliest records — Loch Awe, V.C.98, late April 1992, LMS; Troon, V.C.75, 9/5/92, TM; Loans Village, V.C.75, 10/5/92, TM; last record — Achnamara, V.C.101, 20/10/92, JBH; over 2,000 sightings between these two periods are the subject of a separate article (Sutcliffe, 1994).

1543. *Colias hyale* L., Pale Clouded Yellow. One definite record at Kerrycroy, Bute, V.C.100, 20/8/92, CA; other possible records at Ardrisaig, V.C.101, May 1992, FRD; Causewayhead, Stirling, V.C.86, 30/7/92 & 7/8/92, JLB.

1553. *Anthocharis cardamines* (L.) Orange Tip. North Shian, V.C.98, 26/5/92, DF; Taynish NNR, Kintyre, V.C.101, 6/6/92, JBH; Jamestown, V.C.99, 26/5/92, McM; Pinbain Burn, Lendalfoot, V.C.75, 7/6/92, JPB; Sandford, Strathaven, V.C.77, 7/6/92, EGH; Loch Lomond NNR, V.C.86, 6/6/92, JM.

1555. *Callophrys rubi* (L.) Green Hairstreak. Kentra Moss, V.C.97, 4/7/92, KPB & MRS, larvae common on *Erica tetralix* flowers; Blackhill Mire, Helensburgh, V.C.99, 16/5/92, KF, about 75 individuals seen.

1557. *Quercusia quercus* (L.), Purple Hairstreak. Mugdock, V.C.86, 7/8/92, CS.

1580. *Celastrina argiolus* (L.), Holly Blue. A female seen at Rockcliffe, V.C.73, 20/8/92, PN.

1590. *Vanessa atalanta* (L.) Red Admiral. Many sightings of which the earliest are Threave, V.C.73, 25/4/92, PN; Eaglesham, V.C.76, 3/5/92, MM; from 14/5/92 many sightings throughout Scotland including Kinloch, Rum, V.C.104, 14/5/92, DM; Cumnock V.C.75, 14/5/92, DG; latest record at Rockcliffe, V.C.73, 12/10/92, PN.

1591. *Cynthia cardui* (L.) Painted Lady. Hundreds of records, the earliest on Coll, V.C.103, 14/5/92, IDB; latest at Threave, V.C.73, 21/8/92, PN & Mugdock, V.C.86, 21/8/92, RS.

1594. *Nymphalis polychloros* (L.), Large Tortoiseshell. Scotstoun, Glasgow, V.C.77, July 1992, KA, 4 or 5 specimens released after breeding in captivity.

1597. *Inachis io* (L.) Peacock. Barons Haugh, V.C.77, 19/4/92, RUN, earliest record; latest 23/9/92 at same site; Chatelherault, V.C.77, 14/5/92, CS.

1598. *Polygonia c-album* (L.). The Comma. Shawlands, Glasgow, V.C.77, 14/5/92, MH, single specimen in garden, possible escape.
1629. *Aphantopus hyperantus* (L.). The Ringlet. Threave, V.C.73, 16/6/92, PN, an early record; Bogton Loch, Dalmellington, V.C.75, 10/7/92, AMS.
1748. *Mesoleuca albiciliata* (L.). Ae Forest (NX9893), V.C.72, 13/6/92, KPB; Kinlochail (NM9779), V.C.97, 4/7/92, KPB.
1801. *Perizoma taeniatum* Steph. Resipole (NM7264), V.C.97, 4/7/92, KPB.
1885. *Abraxas sylvata* (Scop.). Larvae abundant on *Ulmus* to N.W. of Lanark (NS8744), V.C.77, 5/9/92, KPB & RKJ.
1928. *Lycia lapponaria* (Boisd.). Larvae swept at Kentra Moss (NM6668), V.C.97, 4/7/92; Resipole (NW7264), V.C.97, 4/7/92; Dubh Loch, Rannoch Moor (NN2753), V.C.98, 5/7/92, MRS.
1939. *Cleora cinctaria* (D. & S.). Larvae swept at Kentra Moss (NM6668), V.C.97, 4/7/92; Resipole (NM7264), V.C.97, 4/7/92, MRS.
1940. *Deileptenia ribeata* (Clerck). Ae Forest (NX9893), V.C.72, 26/7/92 & 25/8/92, KPB.
1965. *Psodos coracina* (Esper). Tom a' Choinich (NH1627), V.C.96 & 106, 15/6/92, many specimens, JL.
1973. *Acherontia atropos* (L.). One found dead, Barr, V.C.75, late May 1992, CW.
1984. *Magroglossum stellatarum* (L.). Newmilns, Ayrshire, V.C.75, 17/5/92, FRW & 29/10/92, NY; Ailsa Craig, V.C.75, 18/5/92 & 16/6/92, BZ; Cambuslang, V.C.77, 20/5/92, JJ; Cruggleton Castle, V.C.74, 23/5/92 & 6/6/92, MNR; Campsie Glen, V.C.86, 7/6/92, MS; Annan, V.C.72, June-July 1992, JG & RN; Pinbain Burn, Lendalfoot, V.C.75, 24/5/92, RH.
2144. *Anarta melanopa* (Thunb.). At 2000 ft on Beinn Bham (NG7743), V.C.105, 27/5/92, PWB.
2320. *Hyppa rectilinea* (Esper). To light at Ae Forest (NX9893), V.C.72, 13-14/6/92, KPB.
2412. *Eustrotia uncula* (Clerck). Glenfinnan (NM9179), V.C.97, 5/7/92, KPB.
2441. *Autographa gamma* (L.). Earliest records — Auchenfad Forest, V.C.73, 14/5/92, MNR; Blackhill Mire, Helensburgh, V.C.99, 16/5/92, RS.

COLEOPTERA

COCCINELLIDAE

Neomysia oblongoguttata (L.). Failford, Ayrshire, V.C.75, 10/9/92, EN.

DIPTERA

TIPULIDAE

Nephrotoma dorsalis (Fabr.). Gartfarran Woods & Brig O'Turk, Stirlingshire, V.C.86, 19/6/92, EGH.

Tipula pruinosa Wiedemann. Brig O'Turk, Stirlingshire, V.C.86, 19/6/92, EGH.

Tipula yerburyi Edwards. Loch Shiel, Argyll, V.C.97, 4/7/92, EGH; Loch Eilt, Argyll, V.C.97, 4/7/92, EGH.

Limonia (Dicranomyia) distendens (Lundstroem). Nr. Arnprior, Stirlingshire, V.C.86, 15/6/92; Drumore Wood, Aberfoyle, V.C.86, 19/6/92, EGH.

Helius pallirostris Edwards. Lake of Menteith, Stirlingshire, V.C.86, 15/6/92, EGH.

Limnophila (Phylidorea) abdominalis Staeger. Brig O'Turk, Stirlingshire, V.C.86, 19/6/92, EGH.

L. (P.) glabricula (Meigen). Gartfarran Woods, Stirlingshire, V.C.86, 19/6/92, EGH.

ANISOPODIDAE

Sylvicola cinctus (Fabr.). Kinlocheil, Argyll, V.C.97, 3/7/92, ovipositing on piles of seaweed at high tide mark, EGH.

MYCETOPHILIDAE

Keroplatys testaceus Dalman. Craigmores Wood, Aberfoyle, Stirlingshire, V.C.86, 19/6/92, EGH.

SYRPHIDAE

Pipizella varipes (Meigen). Nr. Arnprior, Stirlingshire, V.C.86, 15/6/92, EGH.

Myathropa florea (L.), Coille Phuitheachairn, Glen Loy, Argyll, V.C.97, 5/7/92, larvae in rot hole in oak tree, EGH.

Contributors

Charles Anderson (CA), K. Ashton (KA), I.D. Bulloch (IDB), J.L. Bairner (JLB), Dr James P. Black (JPB), Keith Bland (KPB), (the late) P.W. Brown (PWB), J. Coyle (JC), J.H. Dickson (JHD), F.R.E. Durie (FRD), Steve Edwards (SJE), Rev. D. Findlayson (DF), Keith Futter (KF), David Galbraith (DG), Jackie Gillespie (JAG), J. Graham (JG), J.B. Halliday (JBH), E.G. Hancock (EGH), Mrs Hayle (MH), Roy Henderson (RH), Jenny Johnston (JJ), M. Jess (MJ), John Knowler (JK), Robin Knill-Jones (RKJ), J. Leaver (JL), D. Miller (DM), John Mitchell (JM), J. McCleary (JMcC), M. McLean (MM), Mrs McMahon (McM), Steve Moran (SM), T. McFadzean (TM), Eric Nugent (EN), Peter Norman (PN), Russell Nesbit (RUN), R. Norris (RN), Alison Rutherford (AR), M.N. Rankin (MNR), Chris Stephenson (CS), Allan McG. Stirling (AMS), Mr Spencer (MS), Lady M. Stewart (LMS), Mark Shaw (MRS), Richard Sutcliffe (RS), Charles Woodward (CW), Fred Woodward (FRW), J.S. Wilson (JSW), Neil Young (NY), B. Zonfrillo (BZ).

Reference

SUTCLIFFE, R., 1994. The Clouded Yellow Invasion of Scotland, 1992. *Glasg. Nat.*, 22: 389-396.

Some Leaf-mining Diptera from North Uist, Outer Hebrides

K. P. BLAND

35 Charterhall Road, Edinburgh EH9 3HS.

The outer Hebrides have received surprisingly little entomological attention and the species lists so diligently compiled by Waterston (1981) are unlikely to be a true reflection of the diversity of their fauna. The list of leaf-mining flies below is the outcome of a week's stay at Malaclete on North Uist from 11-18 July 1992. The Diptera proved to be even more interesting than the Lepidoptera (Bland, 1993), with one species of anthomyiid being new to Scotland.

Species recorded

In the following list all plant names follow Stace (1991) and Ordnance Survey National Grid references are given in brackets after the place names. All dates are 1992 unless otherwise stated. The following symbols are used:

* denotes new to Outer Hebrides.

** denotes first published record for Scotland.

CHIRONOMIDAE

**Cricotopus (Isocladius) obnixus* (Walker, 1856). A single female reared from linear mines in floating leaves of *Potamogeton* sp. collected at Alioter (NF8873) on 17.vii (unfortunately died partially emerged 26.vii). Identified from Hirvenoja (1973) based solely on ♀ genitalia. The leaf-mine was very similar to that of *C. (I.) brevipalpis* Kieffer, 1909, described by Bland & Rotheray (1993).

TEPHRITIDAE

Euleia heraclei (Linnaeus, 1758). Reared from blotch mines in the leaves of *Heracleum sphondylium* collected at Malaclete (NF7973) on 14.vii (emerged 22.viii). Similar mines seen at Sollas (NF8174) on 12.vii.

**Trypeta artemisiae* (Fabricius, 1794). Characteristic mines in *Artemisia vulgaris* observed at Balranald NR (NF7070) on 14.vii.

DROSOPHILIDAE

**Scaptomyza graminum* (Fallén, 1823). Reared from blotch mines in *Anthyllis vulneraria* collected at Balranald NR (NF6970) on 14.vii (emerged 3-5.viii).

AGROMYZIDAE

Agromyza nana Meigen, 1830. Vacated blotch mines of this species in *Trifolium repens* observed at Malaclete (NF7973) on 11.vii. (Also observed similar mines at Lochboisdale, South Uist (NF7919) on the same day.)

**Phytomyza alpina* Groshke, 1957. Reared from linear mines in *Senecio jacobaea* collected at Eaval (NF9060) on 15.vii (emerged 15-17.viii.).

**P. angelicae* Kaltenbach, 1874. Vacated yellow blotch mines of this species in *Angelica sylvestris* observed at Oban Trumisgarry (NF8774) on 18.vii.

**P. asteris* Hendel, 1934. Reared from linear mines in *Aster tripolium* collected at Oban Trumisgarry (NF8774) on 18.vii (emerged 31.vii).

**P. calthophila* Hendel, 1931. Vacated linear mines of this species in *Caltha palustris* observed at Malaclete (NF7973) on 11.vii.

P. horticola Goureau, 1851. Reared from linear mines in *Cirsium vulgare* from Malaclete (NF7973) on 11.vii. (emerged 17.vii; ♂ genitalia checked) and 12.vii (emerged 17.vii; ♂ genitalia checked); in *Cirsium arvense* from Malaclete (NF7973) on 12.vii (emerged 16.vii; ♂ genitalia checked); in *Sinapis arvensis* from Balranald NR (NF7070) on 14.vii (♀ emerged 23.vii); in *Artemisia vulgaris* from Balranald NR (NF7070) on 14.vii (♀♀ emerged 25.vii); in *Senecio jacobaea* from Balranald NR (NF6970) on 14.vii (emerged 16.vii; ♂ genitalia checked).

**P. plantaginis* Goureau, 1851. Linear mines of this species in *Plantago lanceolata* observed at Solas (NF8174) on 12.vii, at Malaclete (NF7973) on 12.vii and at Balranald (NF6970) on 14.vii. Also reared from linear mines in *Plantago maritima* collected at Oban Trumisgarry (NF8774) on 18.vii (emerged 3.viii). In this latter host plant the larva makes linear mines in the fleshy leaves and pupates, in the mine, well down the leaf stalk.

**P. sphondylii* Robineau-Desvoidy, 1851. Reared from linear mines in *Heracleum sphondylium* collected at Sollas (NF8174) on 12.vii (emerged 30.v.1993). Similar mines observed at Malaclete (NF7973) on 14.vii.

**P. virgaureae* Hering, 1926. Reared from linear mines in *Solidago virgaurea* collected at Crogary Mhòr (NF8673) on 13.vii (emerged 3.viii).

Cerodontha iraeos (Robineau-Desvoidy, 1851). Reared from linear/blotch mines in *Iris pseudacorus* collected at Malaclete (NF7973) on 12.vii (emerged 6.vi.1993). Mines also seen at Alioter (NF8872) on 13.vii.

ANTHOMYIIDAE

**Pegomyia oraria* Collin, 1967. Reared from blotch mines in *Suaeda maritima* collected at Malaclete (NF7974) on 13.vii (emerged 9-25.v.1993). The occurrence of this species, whose identity was determined from examination of the ♂ genitalia, is of interest on several counts: firstly it has not previously been recorded from Scotland; secondly, according to Hennig (1974), its known distribution appears to be only Artern in Thüringen (Germany) and Blakeney Point, Norfolk (England); thirdly the Thüringen specimens were reared from leafmines in "*Obione pedunculata*" (now *Atriplex pedunculata* (Chenopodiaceae)), and possibly "*Spergularia marginata*" (now *Spergularia media* (Caryophyllaceae)). It now seems probable that the latter foodplant may have been based on a misidentification of a non-flowering plant of *Suaeda* sp..

**Pegomyia hyoscyami* (Panzer, 1809). Reared from blotch mines in *Atriplex glabriuscula* collected at Garry Gaal (NF7072) on 16.vii (emerged 20-25.viii & 20.v-2.vi.1993. Identity based on examination of ♂ genitalia).

Acknowledgments

I am grateful to the Royal Museum of Scotland for allowing use of the Scottish Insect Records Index.

Note added in proof: Michael Ackland informs me (*in litt.*) that there are unpublished records of *Pegohylemyia oraria* Collin, 1967 (= *Botanophila depressa* Stein, 1907) from Dornoch, Sutherland; Anglesey, North Wales; Dale, Pembroke; Braunton Burrows & Yelland, North Devon and Novosibirsk, Russia.

References

- BLAND, K.P., 1993. Records of lepidoptera on North Uist, Outer Hebrides. *Glasg. Nat.* 22, 247-250.
- BLAND, K.P. & ROTHERAY, G.E., 1994. The distribution and biology of two leaf-mining species of *Cricotopus* (Diptera: Chironomidae) in Scotland. *Dipterist's Digest* No. 14 (in press)
- HENNIG, W., 1974. *Die Fliegen der Palaearktischen Region* (edit. E. Lindner). Vol. 63a *Anthomyiidae*, 392-3.
- HIRVENOJA, M., 1973. Revision der Gattung *Cricotopus* van der Wulp und ihrer Verwandten (Diptera, Chironomidae). *Annales Zoologici Fennici* 10, 1-363.
- STACE, C., 1991. *New Flora of the British Isles*. Cambridge Univ. Press, Cambridge.
- WATERSTON, A.R., 1981. Present knowledge of the non-marine invertebrate fauna of the Outer Hebrides. *Proc. Roy. Soc. Edin.* 79B, 215-321.

Book Review

Bird Life of Coasts and Estuaries

P. N. FERNS

Cambridge University Press, 1992, 336 pp., many line drawings.
Hardback, ISBN 0 521 34569 3, £29.95.

This is a comprehensive book on the lives of coastal and estuarine birds and on the effects of man's activity directly on their environments (e.g. estuaries) or indirectly in exploiting fish stocks. Dr Ferns discusses habitats, wing characteristics, breeding, food availability and feeding, populations, wintering, disturbance by human activity, and the effects of oil and heavy-metal pollution.

This impressive work lists 726 references, inclusive to 1991, and the data are summarized in 24 tables and 90 figures. While the professional ornithologist must welcome this book, the up-to-date information on the subjects included is valuable to any naturalist.

*J. D. ROBERTSON

*Readers will be sorry to learn that Professor James D. Robertson, a member of the Society since 1956, died suddenly on December 22, 1993.

Book Reviews

The Ecology of Butterflies in Britain

edited by ROGER L. H. DENNIS

Oxford University Press, Oxford, New York, Tokyo, 1992, 354 pp., numerous maps and diagrams. Hardback, ISBN 0 19 854025 6, £50.

If you think that the behaviour and requirements of butterflies are simple and straightforward, then think again! The ecology of butterflies is a very complex subject, but very well dealt with by the authors, who are well-known butterfly experts. The book describes many of the incredibly precise requirements of our British butterflies and tries to explain some of the reasons behind them. It also looks at the monitoring of butterfly populations, the evolution of British ones and the many conservation issues affecting them.

The book contains a wealth of fascinating, detailed information, much of it previously unpublished data, on all aspects of butterfly ecology and provides very useful summaries and appendices, showing differences from species to species.

If you are interested in the finer details of butterflies lives, then this book is a must!

RICHARD SUTCLIFFE

Collins Field Guide: Insects of Britain and Northern Europe, 3rd Edition.

MICHAEL CHINERY

Harper Collins, London, 1993, 320 pp., many black and white drawings and colour plates. Hardback, ISBN 0 00 219918 1, £14.99.

It is exactly 20 years since this field guide was first published and although a 2nd edition appeared in 1976 extensive changes in the taxonomy and nomenclature of insects have made it advisable to publish a 3rd. The author has taken the opportunity to add new information on insect ecology and behaviour, as well as to include improved keys to the families of the Heteroptera and the Plecoptera. Some additions have also been made to the Diptera and Coleoptera.

The book is well produced with clear print and excellent black and white drawings throughout the text and the 66 colour plates are bound together in the middle. This may prove rather less useful than the arrangement in the 1st edition where plates and text relating to each other were together. The quality of the plates is good and the artists are to be congratulated. A short but useful list of firms supplying equipment and living material is included as is a quite extensive bibliography. A full index completes the book.

A. R. HILL

The Clouded Yellow Invasion of Scotland, 1992

RICHARD SUTCLIFFE

Art Gallery & Museum, Kelvingrove, Glasgow
G3 8AG

The Clouded Yellow, *Colias croceus* Geoffroy (Plate 5a, p.348) is a well-known migrant butterfly in Europe. Permanent populations occur in the southern half of Europe and northern Africa, where they breed continuously (Thomas & Lewington, 1991). The butterfly migrates northwards and is regularly seen in the south of England most years, sometimes in very large numbers.

In Scotland, the Clouded Yellow is normally a very rare butterfly, so much so that every single record is notable. Thomson (1980) summarises known Scottish records from 1842 (the first year the butterfly appears to have been noted) up to 1976, with records from at least 64 ten kilometre squares. Small numbers of sightings have been reported between then and 1991 (Table 1).

The two years with the most sightings were 1877 and 1947. 1877 was an extremely good year for Clouded Yellows in Scotland, with several hundred individual butterflies being reported from the borders to Orkney. In 1947, some 261 records from 18 Scottish counties were reported and it is probable that the butterfly again reached Orkney (Thomson, 1980).

In 1992 there was an unprecedented invasion of Clouded Yellows; without doubt the largest number ever recorded in Scotland in a single year, and in fact many more than all previous records put together. A similar phenomenon occurred in Eire, whilst in Northern Ireland, three or four times as many reports were received for 1992 (at least 900 records) than all those previously recorded (Rippey, 1992). Large numbers were also seen in south-west and north-west England and Wales at the same time (Bowles, 1992). In Holland, by contrast, they had far fewer records than usual in 1992 (C. A. M. van Swaay, pers. comm.).

Table 1. Records of Clouded Yellow in Scotland, 1980-1991

Location	Vice County	Date	Number seen	References
Gartmore	Stirling 86	22/6/1980	1	Blount, 1984
Fair Isle	Zetland 112	7-8/1980	1	M. Pennington (pers. com.)
Loch Lomond NNR	Dunbart. 99	31/8/1980	3	Mitchell, 1981
Drymen	"	3/9/1980	1	"
Girdlestone Ness (S. of Aberdeen)	Kincard. 91	28/9/1980	1	Bretherton & Chalmers-Hunt, 1981
Isle of May	Fife 85	3/6/1982	1	Kinnear, 1985
Dunfermline	"	early 8/1982	several	"
	Dumfries. 72	1983	—	Emmet & Heath, 1989
	Kirkcud. 73	"	several	"
	Inverness. 96	"	1	"
	Roxburgh. 80	"	—	"
	Berwick. 81	"	—	"
	E. Lothian 82	"	—	"
	Perths. 88	"	1	"
	Orkney. 111	"	1	"
Rockcliffe	Kirkcud. 73	26/7/1989	at least 4	M. N. Rankin (pers. com.)
Lairg Park Paisley	Renfrew. 76	14/10/1991	1	C. Belling (pers. com.)

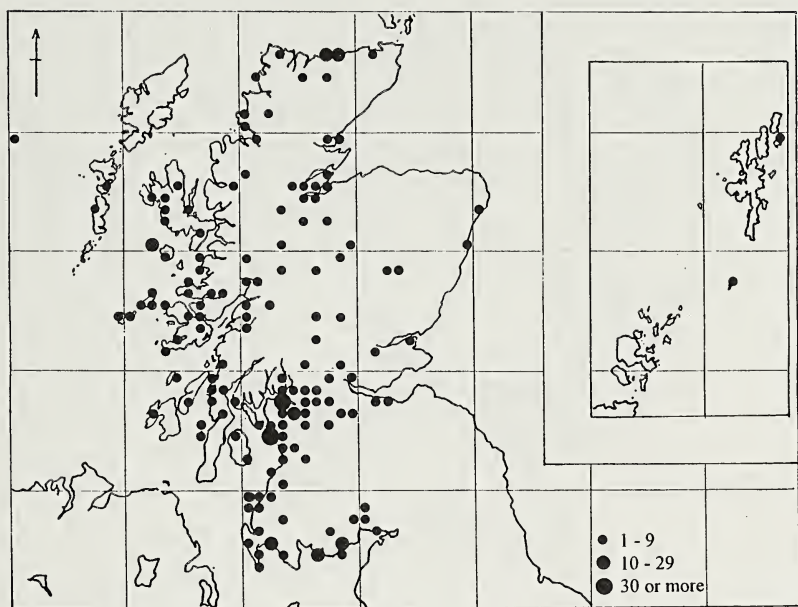


Fig 1. Sightings of Clouded Yellows in Scotland, May and June 1992. (First generation.)

The high number of records reported in 1992 was due to two factors. The early arrival of the butterflies in May was due to an unusual weather system, with southerly and easterly winds, which presumably blew the butterflies out into the Atlantic and then brought them into Britain from the west, rather than by their usual route through mainland Europe and into southern England. Arriving so early in the season, the butterflies had plenty of time to breed in Scotland, resulting in a very large second generation later in the year.

Apart from an isolated sighting of a single Clouded Yellow from Loch Awe in late April (Lady M. Stewart, pers. comm.), and two reports from Ayrshire on 9 and 10 May (T. McFadzean, pers. comm.), the first sightings of the main invasion were made on 13 May from the Luce Bay area of Galloway. Large numbers were reported from the 14 May onwards, associated with large numbers of Red Admirals *Vanessa atalanta* (L.), Painted Ladies *Cynthia cardui* (L.), and several migrant species of moths. Many of these insects were reported flying at a height of over 1000 feet (305m) in the Lake District and Scottish mountains (N. Bowles pers. comm.). It was soon obvious that very

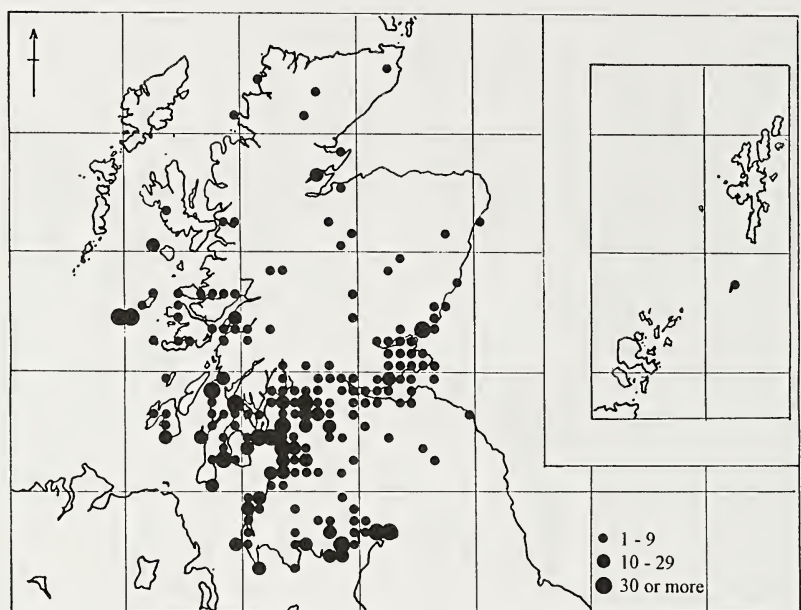


Fig 2. Sightings of Clouded Yellows in Scotland, July-October. (Second generation.)

large numbers of all these migrants had reached Scotland. Initial appeals for records of Clouded Yellows were made by Ray Collier of Scottish Natural Heritage on the radio and in the press. Further letters and articles appeared in the press throughout the summer, concerning the butterflies (The Nature Man, 1992; Gough, 1992; Sutcliffe, 1992; Hodges, 1992). All these articles led to a stream of records being sent to Glasgow Museums. Other records have come from local Biological Record Centres, Butterfly Conservation members, Butterfly Line, published records and numerous individuals. Apart from a very small number of doubtful records, which were probably moths, the records were very reliable. As there are no Brimstone butterflies *Gonepteryx rhamni* (L.), resident in Scotland, it is unlikely that such obvious 'rich sulphurous' coloured insects could be confused with anything other than Pale Clouded Yellows *Colias hyale* (L.) or Berger's Clouded Yellows *Colias australis* Verity, which are even rarer migrants.

Within days of the first arrivals, the butterflies quickly spread throughout much of Scotland. Although most sightings were made along the Solway and Ayrshire coasts, they were present in good

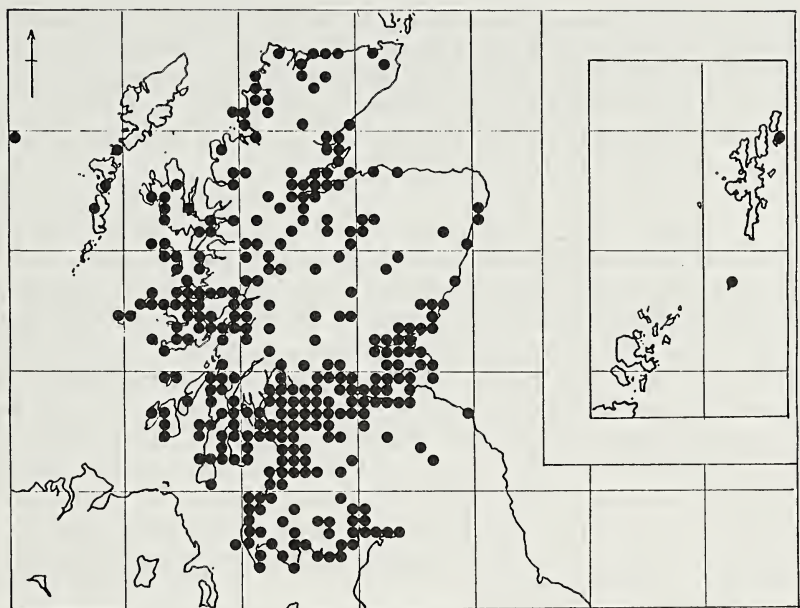


Fig 3. All sightings of Clouded Yellows in Scotland, April-October. (Including those for which exact dates were not known.)

numbers in the Highlands, and one was seen on Fair Isle on 25 May (M. Pennington, pers. comm.). Very few were reported from the east coast at this time, although some had reached Edinburgh and north east Fife by 17 May (Fig.1).

These early arrivals were observed pairing and egg-laying in many parts of Scotland during May and early June. Clouded Yellows lay their eggs on clover and other leguminous plants, and the widespread availability of these common plants obviously allowed the butterflies to breed successfully over a wide area.

The numbers overall dropped dramatically in early June, although they were still to be seen in reasonable numbers at a few localities.

Towards the end of July large numbers of Clouded Yellows were again reported as the second generation started to emerge. At some localities, very large numbers were seen. At least 50 were seen at Browhouses, near Annan, Dumfriesshire at the end of July, 65 were seen between Stevenston and Kilwinning, Ayrshire on 16 July and 29

July and 141 were marked and released at Glengarnock, Ayrshire between 21 July and 20 August (Hope, 1993). In lots of places, the butterflies were seen in twos and threes rather than singly, and there were plenty of reports of numbers reaching double figures. Good numbers were seen over a wide area of Scotland, including the east coast in late July and August (Fig. 2).

In August large numbers were still present at many localities, being supplemented by late second generation individuals. A freshly emerged male was noted still with its chrysalis at Catrine, Ayrshire on 17 August. Poor weather at the end of the month had a detrimental effect on the butterflies, however, and only a relatively small number were seen in September. If the weather had been better, it is interesting to speculate whether there would have been a third generation later in September and into October. A few individuals were reported in October, nearly all from coastal localities, but the first frosts, early in the month, probably killed off most of the remaining ones. The last report came from Achanamara, Kintyre on 20 October, where the warm coastal conditions obviously allowed the butterflies to survive longer.

The Clouded Yellows had been present from May to October and in that time were reported from more than 300 ten kilometre squares (Fig. 3). Sightings were reported of well over 2300 individual butterflies. Although it is likely that a small proportion of these represent repeat sightings of the same individuals on different occasions, it is also likely that the total is only a fraction of the true number present. At a small site at Glengarnock, Ayrshire a maximum of 30 individual butterflies were seen on one day, but marking and release of the butterflies over a four week period showed that 141 different individuals had been present during that time. (Hope, 1993).

In addition to the 'normal' Clouded Yellows, there were many reports of the pale female form var. *helice*. This is a whitish or grey-coloured form and is normally thought to be present as about one in ten of the female population. Some reports, however, suggest that the *helice* form was much commoner in Scotland in 1992. Winokur (1993) obtained almost equal numbers of normal and *helice* females bred from adults taken near Oban, while Hope (1993) noted almost twice as many *helice* as normal females at Glengarnock. It is unlikely that this pattern was repeated throughout Scotland, but the *helice* form was certainly noted over a wide area.

Despite the very large number of Clouded Yellows present in

Scotland, very few Pale Clouded Yellows *Colias hyale*, were reported. The only likely record was of one seen at Kerrycroy, Bute on 21 August (C. Anderson pers. comm.). In addition possible sightings were made at Ardrisaig, Argyll in May (F. R. E. Durie, pers. comm.) and Causewayhead, Stirling on 30 July and 7 August (J. L. Bairner, pers. comm.) It is possible that some of these were incorrectly identified *helice* females.

There will probably not be another 'Clouded Yellow Year' like 1992 for perhaps another 50 or 60 years. Those who saw numbers of the butterflies will probably remember them for a long time to come. It is a great pity that a few collectors insisted on capturing and killing large numbers of them for their collections "because they would probably never get the chance again". As Plate 5a shows, they are much more interesting alive than pinned in somebody's insect cabinet!

Acknowledgments

I would like to thank all the organisations and individuals who took the trouble to pass on their records to me, without which this report could not have been compiled, and to my wife Alison, for putting up with me while I sorted them all out!

The photograph, Plate 5a, was taken at Portencross in July 1992 by T. N. Tait.

References

- BLOUNT, P., 1984. The Clouded Yellow (*Colias croceus* (Geoffr.)) at Gartmore. *Glasg. Nat.* 20: 484-5.
- BOWLES, N., 1992. Butterflies of 1992 *Butterfly Conservation News* 52: 39-41.
- BRETHERTON, R. F. & CHALMERS HUNT, J. M., 1981. The immigration of lepidoptera to the British Isles in 1980, with an account of the invasion of the Painted Lady, *Cynthia cardui* (L). *Ent. Rec.* 93: 105
- EMMET, A.M. & HEATH, J., 1989. *The Moths and Butterflies of Great Britain and Ireland* 7(1). Colchester: Harley Books.
- GOUGH, J., 1992. Heat is on as Plague of Insects swarms in. *Evening Times* 10 July 1992, 16.
- HODGES, J., 1992. Scotland's skies are filled with Clouded Yellow butterflies. *The Sunday Times Scotland*, 9 August 1992.
- HOPE, M. A., 1993. The Invasion of Clouded Yellows to parts of Ayrshire in 1992 and the incidence of *helice* in one study area *Am. Ent. Soc. Bulletin* 52: 55-59.
- KINNEAR, P. K., 1985. Clouded Yellows in Fife in 1982 *Ent. Rec.* 98: 95.

- MITCHELL, J., 1981. Clouded Yellow Butterfly on Loch Lomondside. *Glasg. Nat.* 20: 181.
- RIPPEY, I., 1992. 1992 - A Record Year for Migrant Lepidoptera *B.B.C.S. Northern Ireland Branch Newsletter* 5.
- THE NATURE MAN, 1992. Warm Welcome For The Clouded Yellow. *Sunday Post*, 5 July 1992.
- SUTCLIFFE, R., 1992. Welcome Visitors. *The Herald*, 24 July 1992.
- SUTCLIFFE, R., 1993. Clouded Yellow Invasion. *Glasg. Nat.* 22: 284.
- THOMAS, J. & LEWINGTON, R., 1991. *The butterflies of Britain and Ireland*. London, Dorling Kindersley Ltd.
- THOMSON, G., 1980. *The Butterflies of Scotland - a natural history*. London, Croom Helm Ltd.
- WINOKUR, L., 1993. *Colias croceus* (Geoffrey in Fourcroy) (Lepidoptera: Pieridae) in Argyllshire and some suggestions for further study. *Br J. Ent. Nat. Hist.* 6: 33-35.

Book Review

Insects in Flight

JOHN BRACKENBURY

Blandford, London, 1992, 192 pp., numerous colour photographs, black and white drawings, diagrams. Hardback, ISBN 07137 2301 7, £18.99.

Brackenbury reveals the flying techniques of a range of insects. The book discusses the cost and benefits of flying, the mechanics and precision and the success of aerial activity. Comparative material coupled to colour photography and clear analytical drawings, explains the flight processes of many insects. In Chapter 7 the stroke cycles and air funnelling achieved by the large winged butterflies makes fascinating comparison with moths and other insects.

Chapter 8 highlights jumping insects. Simulation charts encourage flight analysis and reveal the influence of body dynamics on flight efficiency. The globular springtail has to spin twice as fast as its more svelte cousins, which can only be wasteful of energy, analysis which begins to point to the success or otherwise of a range of insects.

The final chapter of the book deals with photographic techniques. The pros and cons of shutter speeds and the use of commercial equipment with which to catch flying and leaping insects in action, is useful reading.

A brief "further reading" list is provided. This is a splendid book both visually and technically; it is a valuable resource for all naturalists.

BRIAN S. SKILLEN

Underground Glasgow: a Study in Environmental and Urban Impact

BRIAN S. SKILLEN

46 Munro Road, Jordanhill, Glasgow, G13 1SF.

The geology of the lower Clyde valley is dominated by carboniferous deposits which form a wide syncline, the centre of which, containing the youngest rocks, underlies Glasgow close to the River Clyde. The strata are affected by minor folds and faults and how this could affect mining is shown in fig. 2 illustrating a basic room and stoop mine working. There is no simple geological pattern.

Many deposits including sandstone, limestone, ironstone and particularly coal, both from the Limestone Coal Group and the Coal Measures, are, or have been, of economic importance and have been mined extensively. The exploitation of these resources greatly influenced the development and economy of Glasgow but at a cost to the town's physical structure.

This article briefly reviews the history of mining in the Glasgow area and looks at aspects of the problems which have arisen from it. The location of sites mentioned in the text are shown in fig. 1.

The development of mining

Glasgow's mining development was linked to its role as a centre for trade and the concomitant demand for fuel. Growth of the export trade from 1556 encouraged development and this expanded in the 18th century as Glasgow responded to new opportunities made possible by the political and economic union with England. The growing population and the rise of service industries to colonial and domestic trade stimulated the need for coal, and investment in business and the development of estates encouraged mining.

With the Industrial Revolution of the early 19th century there came a general increase of mining for all forms of minerals of economic

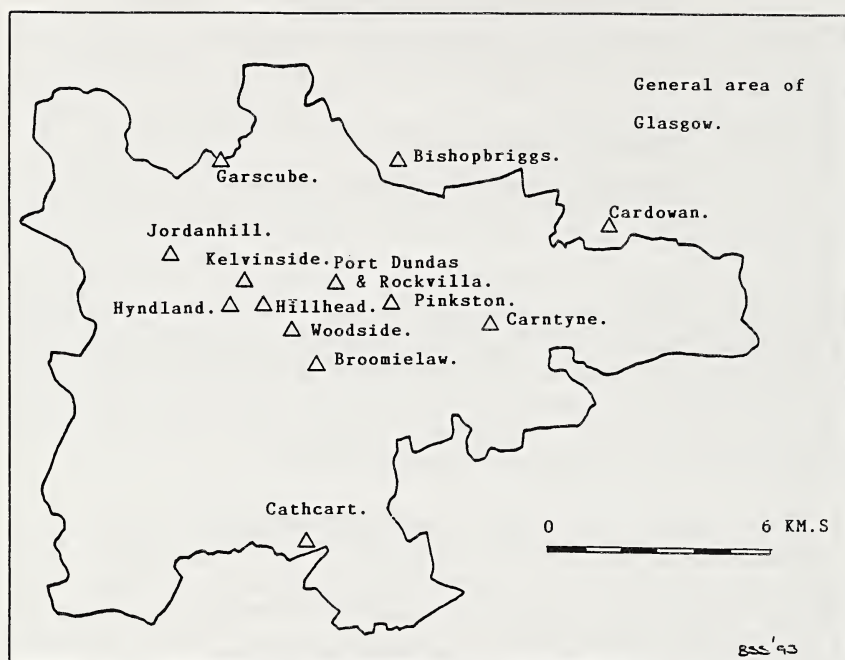


Fig. 1 Locations of some of the places mentioned in the text.

importance. New areas were opened up and often old areas were reworked for seams of importance e.g. the Knightswood Gas Coal. There was also an increase in the amount of deep mining, where seams to a depth of 30m or more were exploited. The early “room and stoop” system of mining, (fig. 2) where pillars of coal (stoops) were left in place to support the roof between the extracted areas (rooms), gave way to longwall workings where the minerals could be taken in full.

Interleaved coal and ironstone was also worked and Blackband Ironstone, once considered to be waste material, became fundamental to the development of Scotland's industrial revolution. Extraction of Ironstone was maximal about 1880 but thereafter declined, as the ores proved unsuitable for the manufacture of steel, and it finally ended after World War 1. In contrast, coal mining was greatest in the present century but ceased in the Glasgow area with the closure of Garscube Colliery in the 1960s and Cardowan Colliery in 1983. Glasgow had a long history of mining the legacy of which was one of environmental and urban impact on land use planning.

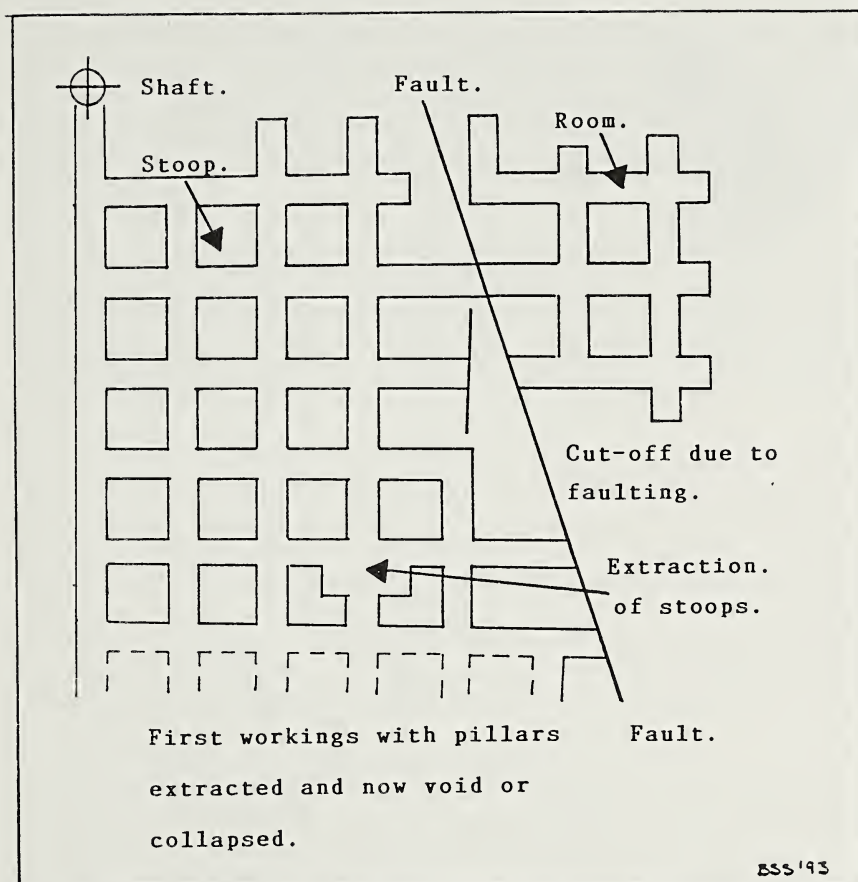


Fig. 2 Room and stoop working showing effects of faulting and clearance of pillars after re-working. (Plan not to scale).

Effects of mining subsidence

Early problems were encountered during the development of Glasgow resulting from low ground stability following mining operations and, in affected areas, landowners and planners had to decide whether or not to cease mining. Often some form of working was continued just to the fore of building lines and the effects of this were considerable.

The most common problem was uneven settlement, usually caused by failure of the underground structure. This often occurred when the unsupported roof of a mine collapsed between the stoops but it also

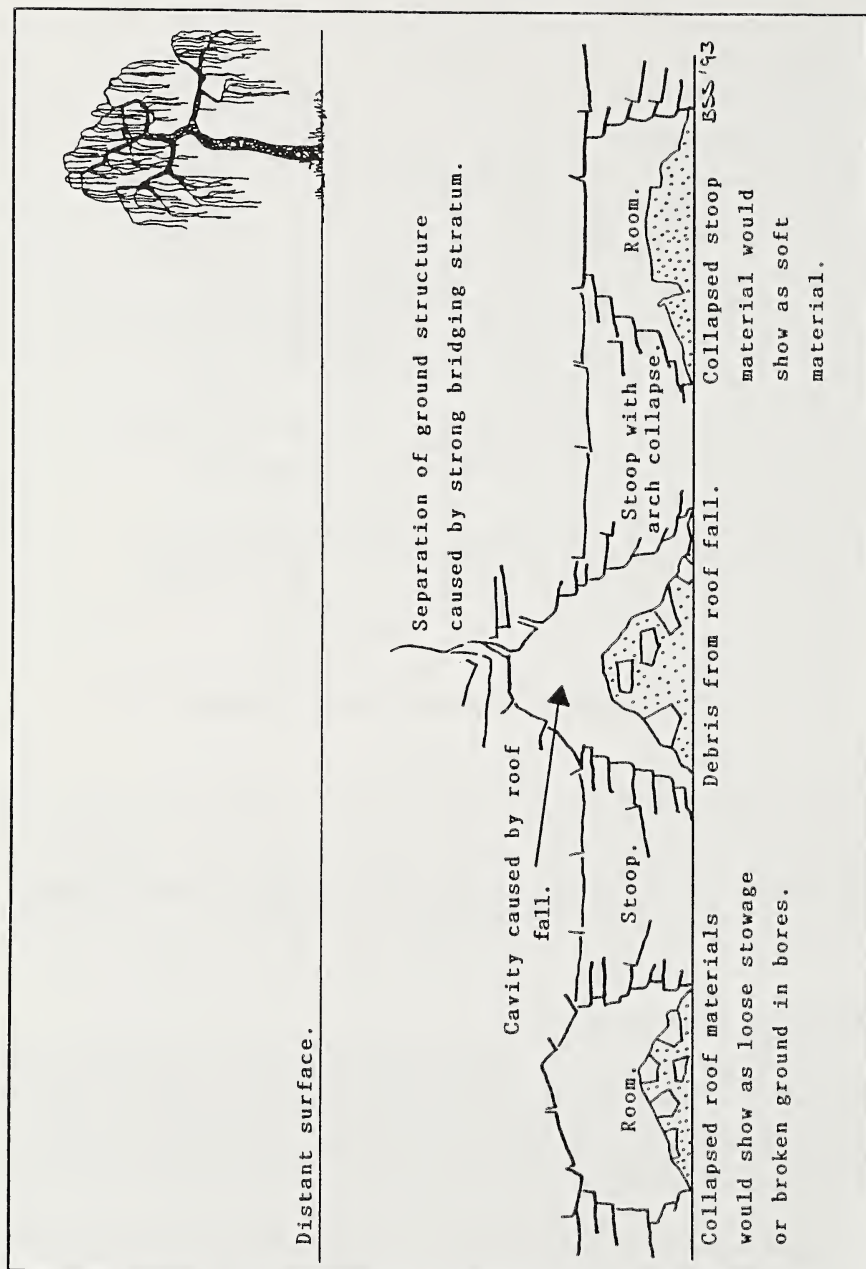


Fig. 3. Roof and stoop collapse in old mine workings.

occurred when the stoops failed due to their being weakened e.g. when old mines were reworked for remaining coal and the stoops were "robbed" (figs. 2 and 3). Water movements also caused problems by destroying the supports such as occurred during the 19th century when pumping was carried out prior to new building work and railway development.

Another problem was "void migration". This occurred when the roof of a mine collapsed layer by layer so that the void, or space, moved progressively upwards. Sometimes this ended in the formation of a surface depression or "crownhole", but often the bulking factor of broken materials prevented such a formation. This occurred e.g. at Hyndland where broken materials were found up to a depth of 9m.

Even where no crownholes formed, uneven settlement occurred and this could be exacerbated by the presence of non-cohesive granular, or soft cohesive subsoils above the rocks. Quarrying for building stone was widespread in the area and many workings had become exhausted and had been filled in (backfilled) either before the original Ordnance Survey 6in maps were produced in 1858, or during the intervals between successive revisions, so that no true records of their positions appeared on them. The same trouble arose with short-lived brickfields, working to the fore of the building line where backfill was often poorly structured.

Inadequate consolidation or backfill not only meant loss of much of the physical evidence of mining and quarrying, but exaggerated the problem of non-cohesive ground structure. The nearest hole was often regarded as a convenient dump, e.g. the old Netherton Quarry received rock debris from the construction of the tunnel and cuttings between Anniesland and Westerton Stations in the 1880s. This probably did not compact and later fill across the site may hide voids formed between the rocks.

The "common coup" system of making up ground with rubbish, sowing it to grass, enclosing it and allowing it to consolidate prior to building, such as occurred between Woodlands Road and Great Western Road from the middle of the 19th century, seemed acceptable practice for the period. In Glasgow, however, there is plenty of visible evidence of damage caused by poor building in relation to such ground conditions: the historical experience of Hillhead being a case in point.

Here, mining pre-dated 1830, after which consideration was given to residential development. The mid-19th century development of the North Park began with the making up of the ground to the level of Great

Western Road and up to 10m of poorly-compacted man-made deposits were tipped onto the flood plain of the River Kelvin. This aggravated problems due to shallow mining and, as soon as building began, crown holes appeared. Some houses, already erected, had to be demolished and rebuilt. At Belmont Crescent, development continued even after a fatal building accident in 1870, causes other than mining subsidence being blamed, even though accessible mine workings were known to be present.

The tendency to ignore geo-technical problems was typical of the time and this was shown in the development of Byres Road which proceeded with no regard to site history, even though, with extensive quarries filled with poorly-compacted ground 8 to 10m deep and mines ranging in depth from 2 to 10m, trouble could only be expected. The subsidence of Loudon Terrace and the consequent remedial expenses alerted the builders and the first site investigations began. The Burgh Commissioners decision to finance the Glasgow Landlord's Association site work hints at the realisation of the problems presented by areas of former mining.

Evidence to the Commissioners considering the construction of the Glasgow Underground reveals how builders approached the problems arising from former mining. William Benzie, a property developer in the district, stated his concerns about building over mine workings and the likely effects of Underground construction. According to him, subsidences at Loudon Terrace and Westbourne Gardens were due to former mine workings which were dry. He regarded water-filled workings as providing a good foundation and considered that draining such areas would erode support pillars and cause subsidence. Locally old coal workings were flooded to a constant level maintained by a fault-line which cut off natural drainage.

The effect of railway building was to cause water movement followed by void migration which threatened many buildings. Even Kelvinbridge moved and it was only with great difficulty that the area was secured. The benefit was an increase in awareness of the problems associated with areas once mined and *Building Industries* of 16 December 1896 had every right to ask why building had been commenced when the area was known to have been worked. The answer was that city surface values outweighed all other considerations — land-use planners were no respecters of environmental geology and all that that meant for health, safety and general welfare.

Suburb development in respect of known mining

At Kelvinside, probably in the light of experience at Hillhead and elsewhere, surviving records of borings showed that many institutional buyers, such as Kelvinside Academy, initiated site investigation before building commenced and a form of planning developed which took into account former areas of mining and quarrying. One result of this was the growth of pleasure gardens and open spaces in the district.

The expansion of Glasgow led to widespread engineering problems and most areas encountered some difficulties, even if only in designing housing and street patterns in relation to the contours of drumlins. The consequent, and still-present, tendency to "open-plan green" development, fitted in well with the Glaswegian's fondness for football: many kick-about pitches occupy former colliery and quarry sites.

Failure to consider ground conditions when planning persisted into the present century: e.g. the Carntyne Housing Scheme was endangered by the failure to appreciate risks from mine workings, 6 to 10m below the surface, where stoop robbing had taken place. The problem was overcome by filling the passageways with brick and concrete. Similar remedial action at the Crowhill Quarry residential development, Bishopbriggs, indicated the need for a policy of "desk-top" research of potential building sites as well as direct investigation through bore holes. Surviving leases revealed a history of subsidence in the area and showed that below sub-surface deposits, 10 to 18m thick, voids of up to 9m or more square could be expected. Consolidation proved feasible, the case clearly demonstrating the need for archival research on building sites.

Hydrogeology

The hydrogeology of Glasgow is complex. There is a multi-aquifer sequence within the Carboniferous bedrock with perched aquifers in unconsolidated glacial drift deposits and flooded mines. In general the mine water is of low quality with high iron content and low pH.

Compressible materials such as peat and soft cohesive soils added to problems as they caused uneven subsidence where they were inter-layered with over-consolidated glacial deposits or cohesion-less sand and gravel. These problems were aggravated by the proximity of the tidal River Clyde as it affected the groundwater regime and, hence, the movement of toxic elements, derived from waste disposal, in flooded old mines and quarries.

Areas of former quarrying were also saturated with water. For example, a former quarry hole run into during construction of the Underground railway at the foot of Glasgow St., Hillhead, flooded the tunnel for 370m. This level of water saturation may have been increased from former unconsolidated mines below the River Kelvin.

Pollution

Pollution, combined with geological structure and the groundwater table, has long caused problems in Glasgow. Many sites have been affected and the dilution and dispersal of waste is a major consideration in the study of the underground of the area.

For much of the 19th century Pinkston Bog was used as a dump for chemicals from various works. This bog had formed a natural basin of sandstone and springs percolating through the chemicals caused a run-off into the Pinkston Burn which, passing through Glasgow as a sewer, entered the River Kelvin near Eldon St. Bridge. It also contributed to a remarkable disaster in 1856 when, as a result of the bog shifting, chemical waste flooded down the Buchanan St. railway tunnel as far as Parliamentary Road.

This dump was dealt with by constructing a sump below the bog to drain it. Firstly a shaft was sunk to a depth of 15m and from this galleries, radiating out to over 274m, were driven enabling effluent to be controlled and worthwhile chemicals to be recovered. These drainage galleries at Pinkston illustrate the value of archives in following up the underground histories of sites.

Pollution plumes still develop within the groundwater table and in recent years one developed from liquid wastes dumped on a landfill site at Greenoakhill in eastern Glasgow. Eventually this reached the River Clyde where it became diluted and dispersed.

Abandoned flooded mines as an industrial resource

Because of pollution and silting, aggravated by high rainfall and rapid erosion, river water in the Glasgow area tended to be of poor quality. In several instances, therefore, mines were used as sources of relatively pure water for industrial purposes.

In the Linn of Cart, there were, until recently, several shafts which had served shallow mine workings. Pumping gear, found in association

with these, was of an unusual kind for mining practice and seemed more likely to be part of an industrial system. This was proved correct at Millholm Mills, Cathcart: the mill had used mine water as a purer source for paper making than that from the silty and discoloured White Cart.

Elsewhere the Baltic Dye Works used water from the Barrowfield mine workings and a quarry hole, buried below Woodside Crescent, was a reservoir for water culverted from the canal at Port Dundas.

Mining and the brick industry

The shale brick industry, involving many companies, e.g. the Kelvinside Brick Company (est. 1891), disposed of much of the surface debris, resulting from local mining, in the Glasgow area and transformed the industrial landscape.

These companies used fire-clay based bing material for brick making, and the rubbish, being combustible, assisted brick burning and made the process economically feasible. Shale bricks were cheap alternatives to clay-based bricks and were much utilised during the development of western Glasgow.

Mining and the naturalist

Materials from bings still survive in the Glasgow area, often as ground fill e.g. at Jordanhill Station, and these and remaining intact bings carry a diverse flora (e.g. Dickson, 1991). There are reasons for their survival within management plans.

Botanists have long had connections with the extractive industries, whether as miner herbalists, gardeners, or capitalists and coalmasters following their hobbies. Thomas Hopkirk was one of the latter, with family wealth founded on the Virginia trade and the mineral resources of Dalbeth. His plant hunting and notes covered diverse areas of mining and quarrying: his studies on grasses of the sandhills of Tollcross is an example. Hopkirk's *Flora Glottiana* also provides clues to a lost landscape, e.g. the former existence of a quarry at Port Dundas is indicated in notes on Greater Knapweed (*Centaurea scabiosa*).

Conclusion

The Industrial history of Glasgow, and its effects on the environment,

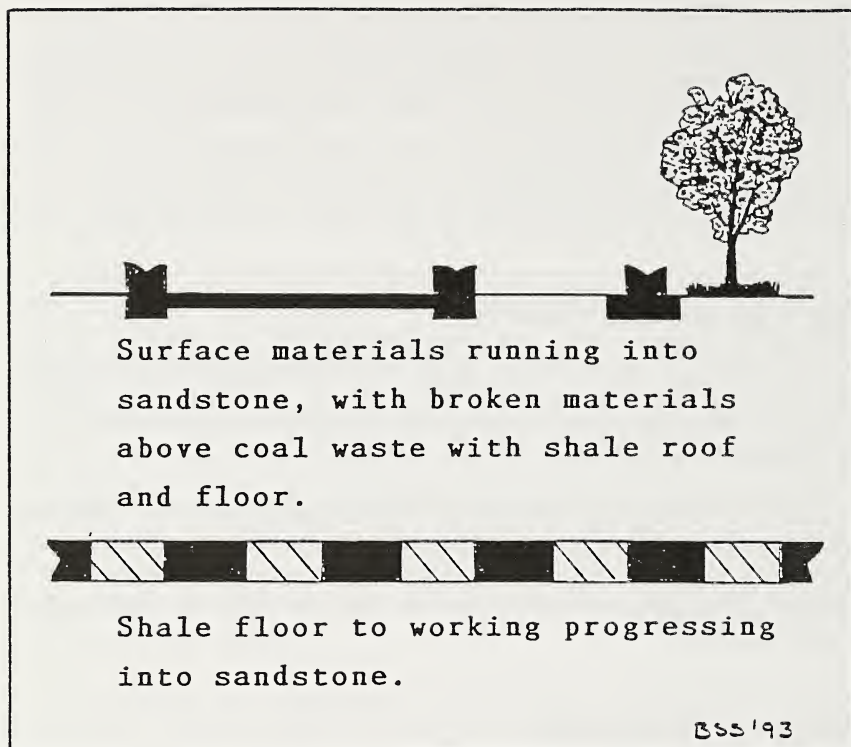


Fig. 4. Idealised section showing conventional spread foundations over infilled workings providing a realistic safe option in an area of former mining. (Not to scale.)

ought to be taken into consideration in planning future developments and naturalists and conservationists should bear this in mind when arguing their cases e.g. for the retention of open spaces within the city and its suburbs. Such ground is often prey to developers in a land-hungry society, and, although in the past planning experience in relation to underground workings was seldom happy, nowadays problems such as subsidence can be easily overcome by modern techniques. Fig. 4 illustrates how underground workings may be consolidated and made safe. Additionally spread foundations relieve stress to some extent on the underground structure. The ground structure is effectively returned to the conditions that might have existed had there been no mining. Hence open spaces, which had remained sacrosanct for years for fear of what was below, are not now at risk from mining but from developers whose environmental concerns may be open to question.

Acknowledgments

I am grateful to Ian Gordon and Stuart M. Nisbet for sharing interests in aspects of this paper. I acknowledge Dr R. M. Dobson for his thoughts on the paper and to the following official bodies for access to materials over the years, The British Geological Survey; The Mitchell Library; The Scottish Records Office and Strathclyde Regional Archives.

References

- ANDERSON, J.G.C. and LAMONT, A., 1935. The geology of the Glasgow district from its quarries. *Quarry Masters Journal* XVIII: 212-217/277-282.
- BROWNE, M.A.E., FORSYTH, I.H. and McMILLAN, A.A., 1986. Glasgow a case study in urban geology. *Jl geol. Soc. Lond.* 143: 509-520.
- DICKSON, J.H., 1991. Conservation and botany of bings. *Trans. Bot. Soc. Edinb.* 45. 493-500.
- HOPKIRK, T., 1813. *Flora Glottiana. A catalogue of the indigenous plants on the banks of the River Clyde and in the neighbourhood of the City of Glasgow.* John Smith, Glasgow.
- SKILLEN, B.S., 1987. *The development of mining in the Glasgow area, 1700-1830.* M. Litt. Thesis. The University of Glasgow.
- Henderson bore table collection.* The Mitchell Library, Glasgow.
- Mineral & site investigation reports. Stevens' collection.* The Mitchell Library, Glasgow.
- Hillhead Burgh Minutes.*
- Building Industries.* 15 January 1894; 15 December 1894; 16 December 1896.
- Glasgow Courier.* 9 September 1856.
- Glasgow Gazette.* 30 August 1856; 13 September 1856.
- Glasgow Weekly Herald.* 10 December 1870; 29 July 1893; 7 October 1893; 19 May 1894.
- West Glasgow Record.* v.d. April — August 1893.

Book Reviews

The Great Tit

ANDREW GOSLER

Hamlyn, London, 1993, 128 pp., numerous colour plates, line drawings and diagrams. Softback, ISBN 0 600 57950 6, £9.99.

In this Hamlyn Species Guide the familiar and well-studied *Parus major* species is reviewed readably in considerable but well-coordinated detail. Classified in four groups with 30 subspecies distributed across Eurasia, the behaviour and general biology are described in relation to geographical, seasonal and other influences – including those of man. There is emphasis on variations, especially those heritable providing the genetic basis for natural selection, adaptation and evolution. Most of the data come from studies of European tits, and gaps in knowledge including those concerning the relatively unstudied non-European tits are indicated as a stimulus for thought and for further research.

There are useful and coloured illustrations (captions reversed on pp. 26 and 31) – not for the coffee table, but recommended for those with special interest: about 300 references, up to date.

NORMAN R. GRIST

Seabirds

ROB HUME, illustrated by BRUCE PEARSON

Hamlyn Bird Behaviour Guides, Hamlyn, London, 1993, 160 pp., numerous coloured and black and white illustrations. Hardback, ISBN 0 600 57951 4, £14.99.

A book with an uninspiring title which claims to be a supplement to field guides by describing how birds behave. Bird behaviour is a vast and complex subject which, even in these enlightened times, is little understood for most species. The main behavioural chapters fall under food and feeding and breeding. There is also a gazetteer of seabird places in the UK and Europe.

Much of the information is fairly basic and is more of a review than a detailed study. There are some simplistic statements on feeding and behaviour which perhaps a more experienced seabird biologist would not make. The artist, Bruce Pearson, has enlivened the book with some well observed paintings and sketches. I like the Gannet, pictured from below while diving upon a shoal of Pollock, unfortunately a fish which Gannets seldom eat. The gazetteer data make me wonder if the authors have visited most of the sites they mention. These points apart, this is a good introduction to seabirds in general, and in these days of inflated prices represents good value for money.

BERNARD ZONFRILLO

Distribution and Species and Length Composition of Wrasse (Labridae) in Inshore Waters of West Scotland

J. W. TREASURER

Fish Health, Lochailort, Inverness-shire PH38 4YA.

Little is known of the biology of wrasse (Labridae) in inshore waters of west Scotland, partly because wrasse have not been considered to have any economic value (Muus & Dahlstrom, 1974). Wrasse have been stocked in cages with farmed Atlantic salmon *Salmo salar* L., in Scotland since 1990 to remove ectoparasitic sea lice (caligid copepods), mainly *Lepeophtheirus salmonis* Kroyer, a major pathogen of farmed salmon (Costello & Bjordal, 1990; Treasurer, 1993). This biological method has advantages over traditional chemo-therapeutants in controlling sea lice infestations (Darwall, Lysaght & Costello, 1991). A new fishery for wrasse has developed on the west coast of Scotland, and it is estimated that in 1991 approximately 100,000 wrasse were captured using fyke nets and to a lesser extent prawn creels (Fig. 1) (Treasurer & Henderson, 1992).

No information is available on the distribution and relative abundance of the five wrasse species found in Scottish waters, namely goldsinny—*Ctenolabrus rupestris* (L.), rock cook—*Centrolabrus exoletus* (L.), corkwing—*Crenilabrus melops* (L.), ballan—*Labrus bergylta* Ascanius and cuckoo wrasse—*Labrus mixtus* (L.). The present report examines the species composition of wrasse, catch per unit effort and length frequency of catches in west Scotland by four fishing methods.

Methods

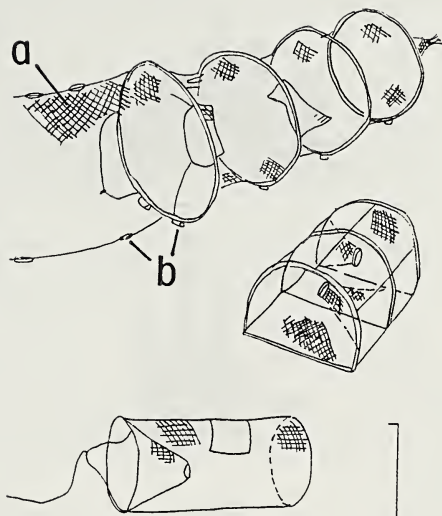
The species compositions of wrasse were measured in catches at Loch Ewe, Loch Torridon, Loch nan Uamh, Loch Sunart, the Sound of Mull, Loch Aline, and Craignish Point in July-September 1990 and 1991 and Greshornish (Skye) in May 1992 (Table 1). The dimensions of unbaited prawn creels were 57cm long x 40cm wide x 30cm high, with an entry aperture of 40mm and 12mm bar mesh size; fyke nets were 10m long (inclusive of leader nets) with hoops of 50cm diameter and

Table 1. Location of fishing areas and percentage composition of wrasse species in catches.

Locality	Map ref.	Fishing method	% catch				Total number fish captured	
			Goldsinny	Rock cook	Corkwing	Ballan	Cuckoo	
Ewe	57°48'N 5°45'W	Baited prawn creel	94	2.4	0	3.6	0	83
Torridon	57°33'N 5°38'W	Baited prawn creel	55.9	35.7	0	1.3	7.1	238
Greshornish (Syke)	57°30'N 6°20'W	Fyke	72	28.1	0	0	0	164
nan Uamh	56°54'N 5°40'W	Fyke	34.2	56.8	9	0	0	111
Ailort	56°41'N 5°40'W	Baited prawn creel	82.8	0	15.2	2	0	99
Sunart	56°41'N 5°48'W	Sunart trap	83.7	13.9	1.3	0.2	0.9	455
Mull	56°37'N 6°03'W	Prawn creel	*					
Loch Aline	56°32'N 5°48'W	Fyke	41.9	53.3	4.8	0	0	105
Linthe	56°37'N 5°30'W	Baited prawn creel	59.1	18.2	4.6	13.6	4.6	44
Craignish Point	56°08'N 5°40'W	Prawn creel	50	47.3	1.8	0.9	0	220

* Insufficient data for species composition but lengths measured

Fig. 1. Three capture traps for wrasse: top – Fyke net (a = leader net, b = weights); middle – modified prawn creel; bottom – Sunart trap. Scale line = 30 cms.

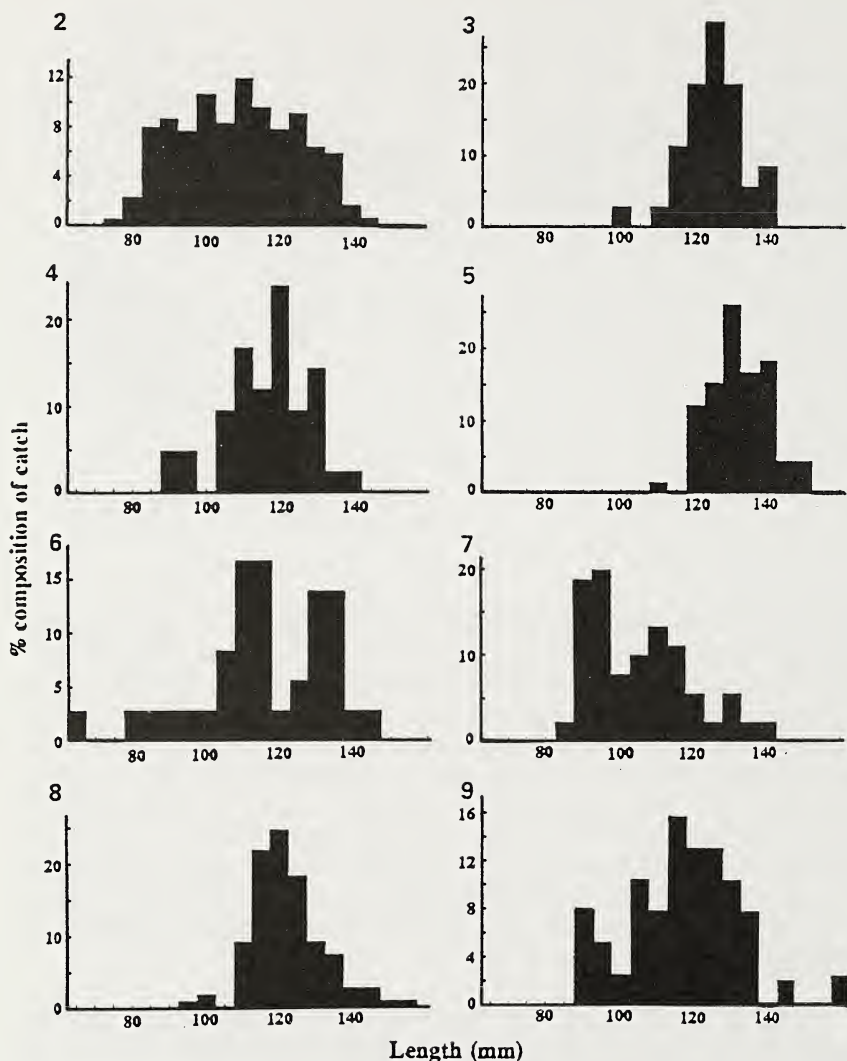


10mm mesh net, fitted with otter guards (Fig. 1). A 12mm mesh polypropylene cylindrical trap was used in Loch Sunart, 60cm long x 30cm diameter, with a 24cm funnel tapering to a 40mm aperture. Fyke nets were fished over one day and traps from 3 to 4 days. Prawn creels baited with shore crab were also set for 30 minutes at Loch Ailort and Loch Linnhe. Wrasse were captured in sheltered bays or sea lochs in shallow water <20m. The range in salinity during the fishing period was 32-34 parts/thousand and that of temperature 10-14°C. At least 30 wrasse were taken from each catch and their lengths were measured to the nearest mm below after being anaesthetised in 15 parts/million benzocaine. The % distributions of these measurements are shown in figs. 2-20.

In some instances age was determined from either sagittal otoliths (goltsinny) or opercular bones (other species) (Treasurer, 1994). The data are shown in figs. 14, 16, 17, 18, 19 & 20.

Results

Goltsinny dominated catches in 7 of the fished localities (Table 1), comprising 94% of wrasse caught in Loch Ewe and 83% in Loch Ailort. Rock cook was the principal species in Loch Aline (53%) and Loch nan Uamh (57%). Corkwing, ballan and cuckoo were relatively



Figs. 2-9: Goldsinny; % length compositions of catches at various sites (N = nos. of fish measured). 2 - Loch Sunart, traps, 6 Sept. 1991, N = 391; 3 - Loch Ewe, creel, 16 Aug. 1990, N = 35; 4 - Lochaline, fyke net, 1 Aug. 1990, N = 42; 5 - Loch Torridon, creel, 20 Aug. 1990, N = 65; 6 - Loch Ailort, creel & fyke net, July 1990, N = 36; 7 - Greshornish, fyke net, 25 May 1992, N = 91; 8 - Craigish Point, creel, 22 Aug. 1991, N = 110; 9 - Loch nan Uamh, fyke net, 3 Sept. 1991, N = 38.

infrequent, together not exceeding 7% of total numbers at any location. Catches in Lochs Ailort and Linnhe were compared by an index of abundance (Table 2), the number of fish per 100 prawn creels/fyke nets set.

Table 2. Catch-per-unit effort (CPUE) and species composition of wrasse in 43 fyke nets and in 862 baited prawn creels at Loch Ailort (July-August, 1990) and in 91 creels in Linnhe fished for 30 minute sets, and the coefficient of variation (CV) of species composition in 60 unbaited traps set for 3 days in Loch Sunart (Sep. 1991).

Loch	Fishing Method	Nos. of fish captured (catch/100 sets in parentheses) by species:				
		Goldsinny	Rock cook	Corkwing	Ballan	Cuckoo
Ailort	Prawn creel	82(9.51)	0(0)	15(1.75)	2(0.23)	0(0)
Ailort	Fyke	25(58.1)	1(2.3)	1(2.3)	0(0)	0(0)
Linnhe	Prawn creel	26(28.6)	8(8.8)	2(2.2)	6(6.6)	2(2.2)
Sunart	Sunart trap	160(2.67)	15(0.25)	1(0.02)	0(0)	0(0)
	CV, 6 sets					
	x 10 traps	0.18	1.88	0.34	0	0

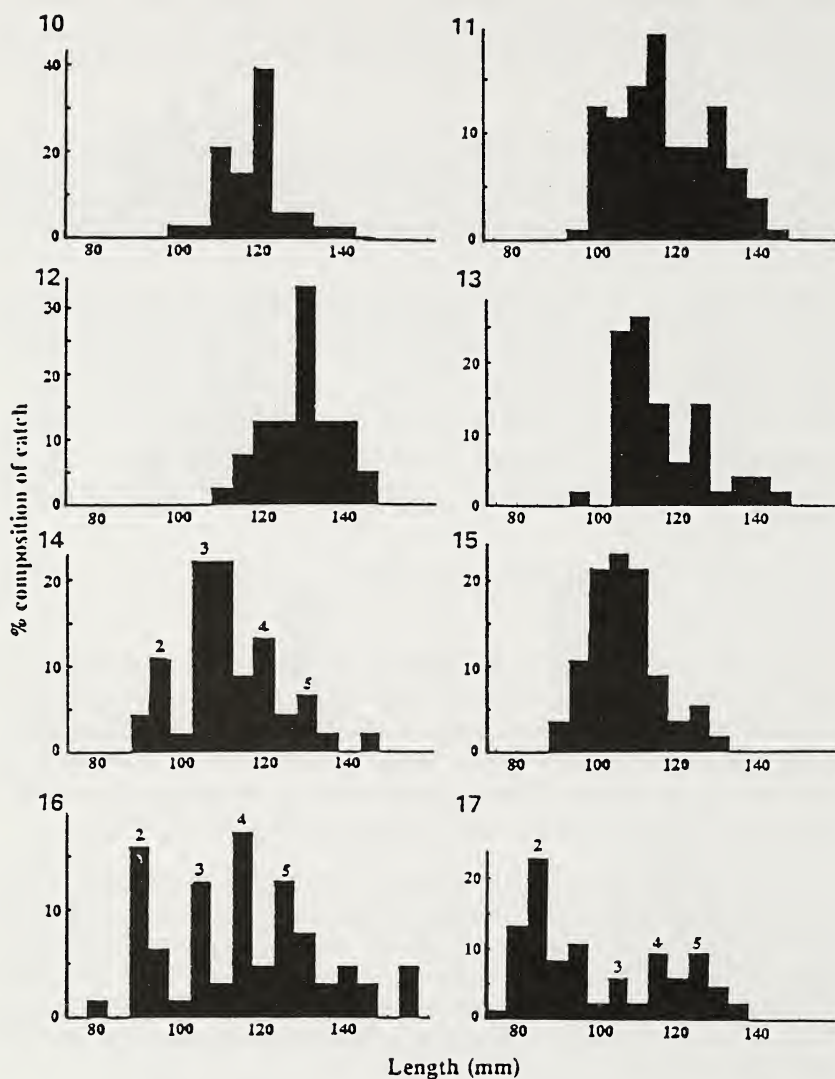
Capture success was higher in Linnhe than Ailort, although goldsinny was the most abundant species at both localities. Rock cook and ballan were both more important in Linnhe. Capture success at Ailort was higher using fyke nets compared with creels but many wrasse were smaller, e.g. 64% of goldsinny <90mm length (Fig. 6), reflecting the smaller mesh size (10mm) of fyke nets compared with creels (12mm).

In all localities, the length frequency distribution in fyke nets, creels and traps was similar in goldsinny, from 65-165mm and rock cook 75-155mm (Figs. 2-17). The exceptions were the smaller numbers of goldsinny and rock cook <100mm captured by creel/trap, the range truncated due to the larger mesh (12mm) size compared with fyke nets (10mm), and thus juvenile individuals of these and the other species were under-represented.

Discussion

Length frequency distribution

The accuracy of the data presented on relative abundance of the five wrasse species found in inshore waters of west Scotland (Table 1) is dependent on the selectivity and catching power of the gear for each



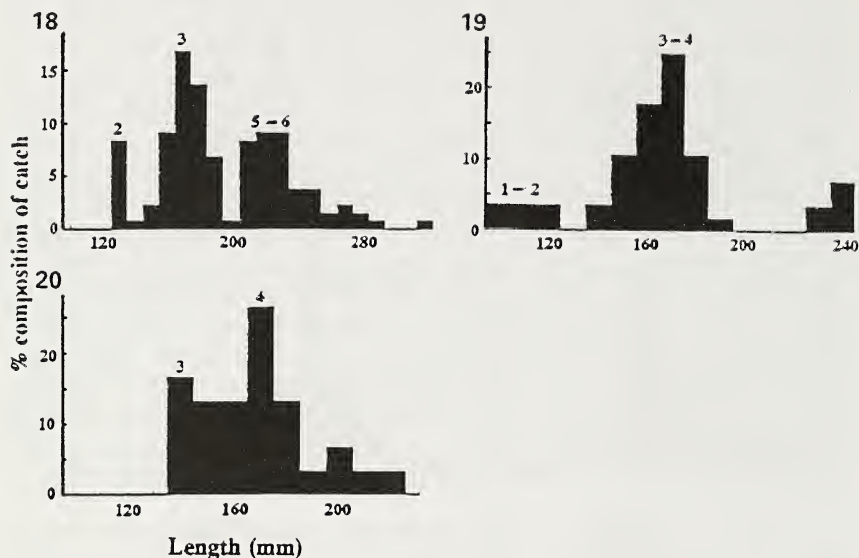
Figs. 10-17: Rock Cook: % length compositions of catches at various sites. (Figures above columns are estimated ages in years; N = nos. of fish measured). 10 – Loch Harport, creel, Aug. 1990, N = 33; 11 – Craignish, creel 22 Aug. 1991, N = 105; 12 – Loch Torridon, creel, 20 Aug. 1990, N = 39; 13 – Mull, creel, Sept. 1991, N = 49; 14 – Greshornish, fyke net, 25 May 1992, N = 45; 15 – Lochaline, fyke net, 1 Aug. 1990, N = 56; 16 – Loch nan Uamh, fyke net, 3 Sept. 1991, N = 63; 17 – Sunart, trap, 6 Sept. 1991, N = 83.

particular species relative to fish behaviour and activity. Catches in the present study were made over a relatively short time-scale, mainly July-September, and four fishing methods were used. While traps and creels depended on the behaviour of wrasse to enter through an 'eye' (Fig. 1), fyke nets guide the fish into a holding bag by means of a 'leader' net and have been used to catch a variety of fish species. Length frequency distributions (Figs. 2-20) and species composition (Table 1) in catches were similar in the four methods suggesting that the catching power of creels/traps was not species-specific. Larger ballan may not have been able to enter the small entrance aperture of creels and Sunart traps (40mm) but ballan obtained using creels of larger aperture size (90mm) and fyke nets (500mm) were mainly smaller (<300mm) and were females. Ballan and cuckoo may be uncommon in inshore waters (Costello, 1991). Fishermen use unbaited creels/traps and catching power is related to inquisitive behaviour or a requirement for shelter in wrasse and this is not confined specifically to the spawning season as in *Perca fluviatilis* (Stott, 1970; Craig, 1975). Farmers routinely use this behaviour to retrieve wrasse from salmon cages by placing creels in cages (pers. obs.).

These observations on distribution and abundance relate solely to late summer (warm water) conditions as the catching power of traps is seasonal, being highly dependent on water temperature with low activity at temperatures <7°C (Darwall et al., 1992). Although Hillden (1981) suggested that wrasse migrate to deeper water in winter, Darwall et al. (1992) reported that wrasse in Irish waters spent much of the winter in rocky crevices.

Distribution

It is concluded that wrasse are widely distributed on rocky and algal inshore areas of west Scotland in summer. There are few comparative quantitative data on the relative abundance of wrasse species. Corkwing and goldsinny were commonly captured in creels in Ireland (Darwall et al., 1992), with corkwing more frequent than goldsinny (at least 10 times more abundant in catches) in Mulroy Bay in the north west, and goldsinny 6.5 times more frequent than corkwing in Lettercallow Bay, west Ireland. Boxshall (1974) reported that ballan was the only wrasse species captured in fish surveys on the Yorkshire coast and was infrequent. Goldsinny wrasse has not been reported from Shetland (Darwall et al., 1992) and neither goldsinny nor rock cook were captured in experimental fishing surveys in Orkney (R. George, pers. comm.). No quantitative surveys of wrasse have been made on the east coast of Scotland but crab fishermen questioned reported only ballan commonly caught in creels



Figs. 18-20: % length compositions of catches. (Figures above columns are estimated ages in years); N = nos. of fish measured). 18 - Ballan Wrasse, Loch Harport, creel, Aug. 1991, N = 131; 19 - Cuckoo Wrasse, Loch Torridon, creel, July - Aug. 1990, N = 17; 20 - Corkwing Wrasse, Loch nan Uamh, fyke net, 3 Sept. 1991, N = 30.

in Fife, Aberdeenshire and the Moray Firth (pers. comm.). The low incidence of four species of wrasse on the east coast of Britain is perhaps due to the limited number of suitable habitat types, particularly the requirement for sheltered water in bays and sea lochs. Another important factor is likely to be poor tolerance of wrasse to low temperature as they are considered to be cold-sensitive (Costello, 1991), and the ameliorating effects of the Gulf Streams are not so pronounced on the east coast.

Acknowledgments

I am grateful to those who assisted in the capture of wrasse, particularly Ian MacWhinney, Steve MacDonald, David Oakes and Rodney George.

References

- BOXSHALL, G.A., 1974. Infections with parasitic copepods in North Sea marine fishes. *J. Mar. Biol. Ass. U.K.* 54: 355-372.
- COSTELLO, M.J., 1991. Review of the biology of wrasse (Labridae: Pisces) in northern Europe. *Prog. Underw. Sci.* 16: 29-51.
- COSTELLO, M.J. and BJORDAL, A., 1990. How good is this natural control of sea lice? *Fish Farmer*, 13: 44-46.
- CRAIG, J.F., 1975. Seasonal variation in the catching power of traps used for perch, *Perca fluviatilis* L. *Freshw. Biol.* 5: 183-187.
- DARWALL, W.R.T., COSTELLO, M.J., DONNELLY, R. and LYSAGHT, S., 1992. Implications of life-history strategies for a new wrasse fishery. *J. Fish. Biol.* 41 (Suppl B): 111-123.
- DARWALL, W.R.T., LYSAGHT, S. and COSTELLO, M.J., 1991. Wrasse — How well do they work? *Aquaculture Ireland*, 5: 26-29.
- HILLDEN, N-O., 1981. Territoriality and reproductive behaviour in the goldsinny *Ctenolabrus rupestris* L. *Beh. Proc.* 8: 87-90.
- MUUS, B.J. and DAHLSTROM, P., 1974. *Collins Guide to the Sea Fishes of Britain and North-western Europe*. London: Collins.
- STOTT, B., 1970. Some factors affecting the catching power of unbaited fish traps. *J. Fish Biol.* 2: 15-22.
- TREASURER, J.W., 1993. Management of sea lice (Caligidae) with wrasse (Labridae) on Atlantic salmon (*Salmo salar* L.) farms. In: Boxshall, G.A. and Raibaut, A. (eds.). *Pathogens of Wild and Farmed Salmonids: Sea Lice*. pp. 335-345. Chichester: Ellis Horwood.
- TREASURER, J.W., 1994. The age and growth of wrasse (Labridae) in inshore waters of west Scotland. *Journal of Fish Biology* (in press).
- TREASURER, J.W. and HENDERSON, G., 1992. Wrasse: a new fishery. *World Fishing*, 41 (11): 2.

Book Reviews

Insects of the Northern Hemisphere

GEORGE C. McGAVIN

Dragon's World Ltd., 1992, 192 pp., many colour drawings and diagrams. Hardback, ISBN 1 85028 151 3, £18.95.

This is one of a number of publications which attempt, in a generalised and popular manner, to treat the subject of entomology. They do this in the main by using high quality colour illustrations and do not shirk from giving details of ecology, behaviour and classification. In this way they have an appeal to a wide audience and avoid the damning description of being a 'coffee table' book. A good feature of this work is that the treatment of the various orders manages to avoid being weighted too heavily towards the more showy insects such as butterflies and beetles. The absence of photographs of living insects does not detract from the attractiveness of the book as the coloured drawings and diagrams by the well-known insect artist, Richard Lewington, are excellent.

From the title it will be noticed that the publishers have an eye on the North American market which the book caters for partly by using some holarctic species as examples. A useful adjunct to each order or family is a small box in which the number of species known to occur in Britain, North America and the whole world is given.

It complements rather than duplicates existing books with similar aims. As there are millions of insects to go around there should be enough room in the market for a reasonably-balanced introduction to the incredible range of form and function in the insect world.

E. G. HANCOCK

Bird Migration

ROBERT BURTON

Aurum Press, 1992, 160 pp., 140 colour diagrams, maps and photographic plates. Hardback, ISBN 1 85410 205 2, £16.95.

Solving the great mystery of where many of our birds disappear to at the end of the summer has come a long way since the 18th century traveller Thomas Pennant was assured by persons of credit at Dumbarton that Swallows in a torpid state had been taken in mid-winter from the steeple of a church and from a sand bank over the River Endrick near Loch Lomond.

With several other titles already under his belt, the author of this superbly produced volume is a recognised expert in the field of popular interpretation of scientific advances. By a series of 'windows' into the world of bird migration in the northern hemisphere, the reader is carefully guided through the progressive unravelling of what, why and how of bird movement. Worth taking off the society's library shelves for the outstanding colour photographs alone.

JOHN MITCHELL

References

- BOXSHALL, G.A., 1974. Infections with parasitic copepods in North Sea marine fishes. *J. Mar. Biol. Ass. U.K.* 54: 355-372.
- COSTELLO, M.J., 1991. Review of the biology of wrasse (Labridae: Pisces) in northern Europe. *Prog. Underw. Sci.* 16: 29-51.
- COSTELLO, M.J. and BJORDAL, A., 1990. How good is this natural control of sea lice? *Fish Farmer*, 13: 44-46.
- CRAIG, J.F., 1975. Seasonal variation in the catching power of traps used for perch, *Perca fluviatilis* L. *Freshw. Biol.* 5: 183-187.
- DARWALL, W.R.T., COSTELLO, M.J., DONNELLY, R. and LYSAGHT, S., 1992. Implications of life-history strategies for a new wrasse fishery. *J. Fish. Biol.* 41 (Suppl B): 111-123.
- DARWALL, W.R.T., LYSAGHT, S. and COSTELLO, M.J., 1991. Wrasse – How well do they work? *Aquaculture Ireland*, 5: 26-29.
- HILLDEN, N-O., 1981. Territoriality and reproductive behaviour in the goldsinny *Ctenolabrus rupestris* L. *Beh. Proc.* 8: 87-90.
- MUUS, B.J. and DAHLSTROM, P., 1974. *Collins Guide to the Sea Fishes of Britain and North-western Europe*. London: Collins.
- STOTT, B., 1970. Some factors affecting the catching power of unbaited fish traps. *J. Fish Biol.* 2: 15-22.
- TREASURER, J.W., 1993. Management of sea lice (Caligidae) with wrasse (Labridae) on Atlantic salmon (*Salmo salar* L.) farms. In: Boxshall, G.A. and Raibaut, A. (eds.). *Pathogens of Wild and Farmed Salmonids: Sea Lice*. pp. 335-345. Chichester: Ellis Horwood.
- TREASURER, J.W., 1994. The age and growth of wrasse (Labridae) in inshore waters of west Scotland. *Journal of Fish Biology* (in press).
- TREASURER, J.W. and HENDERSON, G., 1992. Wrasse: a new fishery. *World Fishing*, 41 (11): 2.

Book Reviews

Insects of the Northern Hemisphere

GEORGE C. McGAVIN

Dragon's World Ltd., 1992, 192 pp., many colour drawings and diagrams. Hardback, ISBN 1 85028 151 3, £18.95.

This is one of a number of publications which attempt, in a generalised and popular manner, to treat the subject of entomology. They do this in the main by using high quality colour illustrations and do not shirk from giving details of ecology, behaviour and classification. In this way they have an appeal to a wide audience and avoid the damning description of being a 'coffee table' book. A good feature of this work is that the treatment of the various orders manages to avoid being weighted too heavily towards the more showy insects such as butterflies and beetles. The absence of photographs of living insects does not detract from the attractiveness of the book as the coloured drawings and diagrams by the well-known insect artist, Richard Lewington, are excellent.

From the title it will be noticed that the publishers have an eye on the North American market which the book caters for partly by using some holarctic species as examples. A useful adjunct to each order or family is a small box in which the number of species known to occur in Britain, North America and the whole world is given.

It complements rather than duplicates existing books with similar aims. As there are millions of insects to go around there should be enough room in the market for a reasonably-balanced introduction to the incredible range of form and function in the insect world.

E. G. HANCOCK

Bird Migration

ROBERT BURTON

Aurum Press, 1992, 160 pp., 140 colour diagrams, maps and photographic plates. Hardback, ISBN 1 85410 205 2, £16.95.

Solving the great mystery of where many of our birds disappear to at the end of the summer has come a long way since the 18th century traveller Thomas Pennant was assured by persons of credit at Dumbarton that Swallows in a torpid state had been taken in mid-winter from the steeple of a church and from a sand bank over the River Endrick near Loch Lomond.

With several other titles already under his belt, the author of this superbly produced volume is a recognised expert in the field of popular interpretation of scientific advances. By a series of 'windows' into the world of bird migration in the northern hemisphere, the reader is carefully guided through the progressive unravelling of what, why and how of bird movement. Worth taking off the society's library shelves for the outstanding colour photographs alone.

JOHN MITCHELL

Short Notes

Compiled by A. McG. Stirling

Botanical

Additions to the list of Liverworts for the Isle of Muck, V.C.104

RUTH H. DOBSON and
N. G. HODGETTS

The following list of liverworts collected by one of the authors (R.H.D.) is additional to that given by Hodgetts (1992). As before, records are attributed to the 10km squares of the National Grid, NM37, 38, 47 and 48. Order and nomenclature follow Smith (1990).

Calypogeia sphagnicola (H. Arn. & J. Perss.) K. Muell. (1) Am Maol lochan, 48 (Nov 1983); Bog near Port Mor, 47, New to Small Isles (Nov 1983).

Cephalozia pleniceps (Aust.) Lindb. (1) Wet area west of Gleann Mhartein, 38. New to V.C.104 (May 1984).

Jungermannia sphaerocarpa Hook. (*S. sphaerocarpum* (Hook.) Steph.) (infertile specimen) Rock near Achadh na Creige, 38. (Feb 1984).

Scapania compacta (A. Roth) Dum. Rocks, Ard nan Uan, 48. (Nov 1983).

Scapania irrigua (Nees) Nees Hummocks, Lamb Island, 38. (Nov 1983).

Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dum. Spring area by stream near Camus Mor, 47. New to Small Isles.

The authors are grateful to Martin Wigginton for confirming the records of *Calypogeia sphagnicola* and *Cephalozia pleniceps*.

References

- HODGETTS, N. G., 1992. The Natural History of the Muck Islands, North Ebeudes. 8. Bryophytes of Muck. *Glasg. Nat.* 22: 141-154.
SMITH, A. J. E., 1990. *The Liverworts of Britain and Ireland*. Cambridge.

Pitcherplant (*Sarracenia purpurea*) in Argyll, V.C.98

B. H. THOMPSON and
A. McG. STIRLING

In November 1992 Jenny Rees of Scottish Natural Heritage, Fort William, discovered a small population of this introduced carnivorous plant on Rannoch Moor. In July 1993 on a very wet day she kindly accompanied the writers and A. A. Slack to see the plants. A further visit was made by A. A. S. and A. McG. S. in better weather conditions to take photographs (Plate 5c, p.348), and later B. H. T.

returned with G. P. Rothero who kindly identified the *Sphagnum* species and helped to make a careful count of the plants.

The Pitcherplants all grow in *Sphagnum*-dominated vegetation beside bog pools and are scattered within an area that Jenny Rees estimated to be some 50m in radius. In all, 27 groups were found and of these one consisted of 3 plants, two of 2 plants and 24 of single plants making a total of 31 individuals. Two plants had flowers and another had the dead flower stem from the previous year.

Associated species of higher plants are few; Bog Asphodel (*Narthecium ossifragum*), Cross-leaved Heath (*Erica tetralix*), Heather (*Calluna vulgaris*), and Round-leaved Sundew (*Drosera rotundifolia*) being the most frequent, while Common and Hare's-tail Cottongrasses (*Eriophorum angustifolium* and *E. vaginatum*) are occasional, and Heath Rush (*Juncus squarrosus*) is rare. Four *sphagnum* species occur.

In Ireland Pitcherplant is known from several sites in 6 vice-counties, all originating by transplantations from the original introduction to Co. Roscommon in 1906. There it is evidently capable of seed production, and plants overwinter. In England 4 populations are known in Cumbria, where it is increasing.

On Rannoch Moor *Sarracenia* is probably at a higher elevation than any of the Irish or Cumbrian populations and will have to withstand harsher conditions. As far as we know, this is the first record of *S. purpurea* from Scotland although a few plants of an unidentified species of Pitcherplant have been noted in East Inverness-shire.

We may never know who made this introduction to Argyll but it will be of great interest to monitor progress. Perhaps one day they will be a familiar sight on Rannoch Moor!

Fringed Water-lily in Dunbartonshire

J. MITCHELL

In the summer of 1990, a flowering patch of Fringed Water-lily *Nymphoides peltata* Kuntze was found in the upper of two dams NS444871 at Wards near Gartocharn (V.C.99).

Until the mid-1920s, Wards Dams provided the head water to power a water-wheel used for draining low-lying land beside the River Endrick. Although there are no records to confirm, it seems likely that the Fringed Water-lily was introduced by accident or design in the early 1980s, when management work was carried out to

convert the upper dam into a carp pond. Observations maintained over the next 3 years have shown the original lily patch continuing to expand, with the appearance of several other small colonies elsewhere in the upper dam.

The Fringed Water-lily has a south-eastern distribution in Britain, being particularly abundant in the washlands of East Anglia. As a west of Scotland plant it has recently been reported as a casual in backwaters of the River Awe, Argyll (*Glasg. Nat.* 21:191).

Water-violet in Strathclyde Country Park KEITH WATSON

A surprising find on a recent habitat survey of Strathclyde Country Park for the Clyde Calders Project was a population of Water-violet (*Hottonia palustris*). It occurs to the edge of a small pool in the Low Parks area of the Country Park, just north of the Mausoleum, near the motor way services (NS724565; V.C.77). It appears to be well established in the narrow marginal fen, with several floating plants showing their distinctive whorled pinnate leaves, and a few individuals were in flower (June, 1993).

The *New Flora of the British Isles* notes Water-violet as scattered in England and Wales, as far north as Yorkshire and Lancashire, and locally naturalised in Ireland. *The Flowering Plants and Ferns, of North Lancashire* (L. A. & P. D. Livermore) notes a single record (near Cockerham) as "rare, one site, probably now lost". It appears to have only one previous published Scottish record (*Flora of Moray, Nairn & Inverness*: M. M. Webster), from the Culbin Forest, Moray (V.C.95), where it was known from 1923 until 1958 (specimen in Herb GL).

It is possible that the Water-violet is an invading alien that has been "naturally" dispersed by migratory birds; the Moray record was considered "doubtfully native, probably introduced on the feet of water fowl". The Country Park Rangers are not aware of any introductions of plants to the pool, except Common Reed but this came from the Lake of Menteith.

A Large Stand of Giant Knotweed (*Fallopia sachalinensis*) at Skipness, Kintyre

J. H. DICKSON

In his *Flora of Kintyre* and its supplement, Kenneth gives Ardrishaig as the sole locality of this enormous herb (Cunningham and Kenneth 1979; Kenneth 1985). At Skipness there is an additional stand

forming a very large colony. Growing towards the uppermost part of the shore, it is just outside the southwest part of the wall of the garden of Skipness House (NR 906576). Roughly rectangular in shape and with stems up to 3m tall, the colony measured 70x22 of my paces (c.59x19m) in September 1993. In her account of its British and Irish occurrences Conolly (1977) mentions stands of Giant Knotweed 20 and 30 yards in extent in Britain and a quarter of a mile along an Irish river; it is not clear if the last represents one discrete clone. The Skipness stand has the appearance of growth from a single dumping, probably from Skipness House. The growth of other plants under the stand is very sparse but I noted *Silene dioica*, *Aegopodium podagraria*, *Scrophularia nodosa*, *Rubus fruticosus* and *Crocsmia x crocosmiiiflora*.

References

- CONOLLY, A., 1977. The distribution and history in the British Isles of some alien species of *Polygonum* and *Reyneutria*. *Watsonia* 11, 291-311.
 CUNNINGHAM, M. H. and KENNETH, A. G., 1979. *The Flora of Kintyre*. Wakefield.
 KENNETH, A. G., 1985. Additions to *The Flora of Kintyre*. *Glasg. Nat.* 21:1-12.

Willow Gentian (*Gentiana asclepiadea* L.) in Perthshire

N. CRAIB,
R. HUNTER and A. LAIRD

According to the *New Flora of the British Isles* (Stace 1991) Willow Gentian is grown in gardens, self-sows freely and is naturalised by streams and in shady places; only two places are mentioned, both in Sussex. However, this attractive native of the Alps and north Apennines was found well naturalised in the now rough lawns at Gartshore Estate near Kirkintilloch by J. H. Dickson *et al.* during the Flora of Glasgow Project in the 1980s.

We can now add another locality. In September 1993 we found a patch of Willow Gentian on the bank of the River Forth at Lemahamish Pool (NS 529 990) in Perthshire (V.C.87); the species is unlisted for Perthshire by Smith *et al.* (1992). On a return visit two weeks later we saw that the patch had been dug up; some roots remain and so the plant may grow up again. The locality is far from any garden and the precise position of the patch makes deliberate planting an unlikely origin. Naturally dispersed seed may be the explanation.

References

- SMITH, R. A. H., STEWART, N. F., TAYLOR, N. W. and THOMAS, R. E., 1992. *Checklist of the Plants of Perthshire*. Perthshire Society of Natural Science.
 STACE, C., 1991. *New Flora of the British Isles*. Cambridge University Press.

***Fallopia x bohemica* (Chrték & Chrtková) J. H. DICKSON and
J. Bailey in the Glasgow Area K. WATSON**

This vigorous hybrid of Japanese Knotweed (*Fallopia japonica*) and Giant Knotweed (*Fallopia sachalinensis*) appears to have few records from Scotland. In the summer of 1993 it has twice been found in the Glasgow area.

1. Edge of unimproved grassland by conifer plantation near Dumbrook Loch, Strathblane, V.C.86 (NS 547782). Collected and identified by J.H.D., 12 September 1993. This is a large patch over 2m tall, growing in the absence of the parents. Alongside the *Fallopia* is a large form of Himalayan Knotweed (*Persicaria wallichii*).

2. Disturbed bank of Black Cart Water at Millikenpark, Johnstone, V.C.76 (NS 413626). Collected and identified by K.W. 20.9.1993. This is also a large patch about 2m tall, with *F. japonica* nearby.

The identity of both specimens has been confirmed by Dr J. Bailey of the Department of Botany, Leicester University. The hybrids are intermediate between the parents in stature and in leaf shape and hairiness. The leaves are slightly but distinctly cordate, unlike those of Japanese Knotweed which are truncate, and unlike those of Giant Knotweed which are strongly cordate.

Despoiling of Willows by beetles near Kippen I. McCALLUM

During a Scottish Wildlife Trust outing to Kippen, Stirlingshire, on 19 September 1993, it was noted that there was extensive despoiling of willow trees in the surrounding area. The species affected was the Common Sallow (*Salix cinerea* subsp. *oleifolia*).

On closer examination it was observed that there was an infestation of small green beetles 4-5mm long. These proved to be *Phyllodecta vulgatissima* (L.) a species which can occur in large numbers on willows in central Europe where it can reach pest proportions. It will be interesting to see if the willows continue to be affected next year or whether the beetle numbers dramatically reduce to enable the trees to return to normal.

I am grateful to Dr R. M. Dobson for confirming the identity of the beetle specimens and to A. McG. Stirling for naming the willow species.

Plant notes from Argyll, V.C.98

B. H. THOMPSON

In addition to Pitcherplant (see above) four other interesting records were made on Rannoch Moor. Marsh Clubmoss (*Lycopodiella inundata*) is locally plentiful at one of the Dubh Lochans near Kingshouse and one tiny patch was found by Loch Ba. The last published record for Argyll was in 1960. The hybrid between Round-leaved Sundew (*Drosera rotundifolia*) and Great Sundew (*D. longifolia*) = *D. x obovata* was also seen by Loch Ba growing with both parents. Least Water-lily (*Nuphar pumila*) was also found in one of the above Dubh Lochans (confirming a nineteenth century record) and in a small lochan west of the A82. This latter area produced two well-separated and good populations of Rannoch-rush (*Scheuchzeria palustris*), apparently the first to be noted to the west of the main road.

Only one further site was found during the year for Adder's-tongue (*Ophioglossum vulgatum*). It is tempting to think one is simply overlooking this unassuming fern, but populations are probably very scattered and absent on more acid soils. Chemical control of bracken, under which the fern often grows, has probably destroyed many populations.

Three further sites were located for Royal Fern (*Osmunda regalis*) – a single plant at the edge of a disused quarry pond on Seil Island, two plants on an island in Loch Awe, and a tiny population in craggy woodland above Crarae, Loch Fyne. Both the first and the last may have had their origins in spores from garden plants. One wonders if the Victorian collectors really did almost eliminate this fern in a county such as Argyll? If it was ever plentiful there would surely be more frequent remnants in the many low-level ravines and crags.

A second site was found for the introduced Ostrich Fern (*Matteuccia struthiopteris*). Outside the Argyll Estates office near Inverary it has spread quite vigorously into adjacent woodland.

Three "new" willow hybrids were confirmed by R. D. Meikle (though there could be specimens in herbaria) – Shrubby Osier (*Salix x fruticosa*) = Osier (*S. viminalis*) x Eared Willow (*S. aurita*) – roadside between Kilmartin and Kilmichael; *Salix x reichardtii* = Goat Willow (*S. caprea*) x Rusty Willow (*S. cinerea* subsp. *oleifolia*) – foot of Glen Shira and near Inverawe; *Salix x ambigua* = Eared Willow (*S. aurita*) x Creeping Willow (*S. repens*) – collected on Lismore in 1992, where it is the place for it to occur as *S. repens* is rather rare elsewhere in Argyll.

First county records were made for three alien species – the

bramble "Himalayan Giant" (*Rubus armeniacus*) was found by A. McG. Stirling at Taynuilt in 1992; Bronzy Willowherb (*Epilobium komarovianum*) collected by E. L. S. Macpherson at Oban in 1961 but only recently confirmed by E. J. Clement as this species. Likely to occur elsewhere, Lesser Swine-cress (*Coronopus didymus*) was beside a track north of Inverary Castle.

Continued examination of the quadrifid bladder hairs of Intermediate Bladderwort indicates that populations so far checked are Nordic Bladderwort (*Utricularia stygia*). Unfortunately Argyll plants appear never to flower so we are dependent on this microscopic character.

Further sites continue to turn up, mainly near habitation, for Himalayan Honeysuckle (*Leycesteria formosa*) and indications are that this seeds itself quite freely and is spreading.

Equally as mysterious as its appearance at Carntyne, Glasgow, in 1989, was the presence in September of a single plant of Bristly Oxtongue (*Picris echioides*) by a track on the Lunga Estate, Craignish. There is a riding school stable nearby and the plant's origin was perhaps from animal feed in horse dung.

A second record for Narrow-leaved Water-plantain (*Alisma lanceolatum*) was made at Inchrachan Loch near Taynuilt. This reservoir is less than two kilometres from the site of the first record made in 1965 by the late A. G. Kenneth.

Perhaps the most significant discovery of the year was a very small colony of Herb-Paris (*Paris quadrifolia*) in Glen Shira. The only other Argyll records are from Glen Nant, and one site by Loch Awe where only one plant was seen on a recent visit.

Sand Leek (*Allium scorodoprasum*) was found recently by Dr C. Gibson at Toward Point. There is a good population there but perhaps some doubt as to its native status. It is a new record for V.C.98.

Finally, only one further colony of Bog Orchid (*Hammarbya paludosa*) has been found in 1993. However, the indications are that this diminutive orchid, while easily overlooked, is not rare where suitable habitats occur.

Base-rich Grassland in Industrial Lanarkshire

P. MACPHERSON

A specimen sent to me in 1989 by Bruce Philp for identification was Blue Fleabane (*Erigeron acer*). The plant was from the edge of a road

leading into a foundry at New Stevenston, Lanarkshire, V.C.77.

An inspection of the site in 1993 revealed that the Blue Fleabane was well established, being spread over the bare ground at the roadside and the barer parts of adjacent grassland. It is a plant of barish sandy or calcareous soils and wall tops, locally frequent in England and Wales but casual in Scotland. A single plant of this category was detected on a Glasgow building site during 1993. The New Stevenston occurrence was a new vice-county record.

On the grassland there was also an assemblage of plants more likely to be encountered in base-rich rather than in other soils:

Cowslip (*Primula veris*) is usually found on light, base-rich soils. Hopkirk (1813) knew it as an introduction about Bothwell and Woodhall. Perring and Walters (1962) give one record for Lanarkshire and I know of one other record as an introduction. At the New Stevenston site only one plant was detected.

Fodder Burnet (*Sanguisorba minor* subsp. *muricata*) was also present. It was formerly grown for fodder and is still established in scattered grassy places in the British Isles, though frequent only in central and southern England. There have been a number of casual records from the Glasgow areas in recent years, but the fact that over 20 plants were present indicates that the species is well established at New Stevenston.

Wild Carrot (*Daucus carota* subsp. *carota*) is found mostly on chalky soil. It has been recorded, sometimes in abundance, from rubbly and grassy waste ground in the Glasgow area. At New Stevenston 15 plants were present.

Hoary Plantain (*Plantago media*) is a plant of neutral and basic grassland. It has been reported from the neighbourhood of Bothwell Castle (Lee, 1933) and from waste ground near the Glasgow Art Gallery and Museum (Grierson, 1930). There is only one record for Lanarkshire in the *Atlas of the British Flora* and I was able to find only one plant on the site.

Hawkweeds. Apart from the ubiquitous *Hieracium vulgatum*, hawkweeds prefer alkaline soils. Four species were present. *H. sabaudum* and *H. 'pseudorigens'* (ined.) which are common, particularly on waste ground, in the Glasgow area, and *H. grandidens* for which there are a few records. The other 'hawkweed' was Yellow Fox-and-Cubs (*Pilosella caespitosa* subsp. *colliniformis*) for which

there is one other local record, near Milngavie, in V.C.99. All four were common on the periphery of the site. The well established occurrence of Yellow Fox-and-Cubs constitutes a new vice-county record.

Yellow Oat-grass (*Trisetum flavescens*) is found especially on basic soil. In the *Atlas of the British Flora* there are found records round the periphery of Lanarkshire and which may be within V.C.77. In recording for the *Flora of Glasgow* (Dickson 1984) it has been recorded from King's Park. It was frequent over one section of the grassland.

Quaking-grass (*Briza media*) is found in a variety of habitats, but usually on base-rich soils. It has however been found in most of the 10km squares in Lanarkshire. In the New Stevenston site it was slightly more frequent than Yellow Oat-grass.

Enquiry at the adjacent foundry elicited the information that until 15 years ago the ground was made up with waste sand containing sodium silicate and this would leach out alkaline. The site is separated from land nearer the foundry by a small stream. This latter area was made up with waste products after the process had been changed and would be acidic. None of the above-mentioned plants grew on the acidic ground. A soil sample from barish ground near the edge, on which a plant of Blue Fleabane was growing had a pH of 7.9 and another from within 3" of the Hoary Plantain was pH8.4. Neither area had ever been seeded although a few plants of *Cornus alba* had been planted towards the back of the alkaline site.

Much of the information relating to the soil and plant distribution has been derived from the *New Flora of the British Isles* (Stace, 1991).

I am grateful to Dr J. H. Dickson and A. McG. Stirling for supplying recent records from the Glasgow area and to D. J. McCosh for confirming the hawkweed identifications. Dr Dickson also arranged for the pH testing.

References

- DICKSON, J. H., 1984. Records for *The Flora of Glasgow* I. Some grasses and other Monocotyledons. *Glasg. Nat.* 20: 465-468.
 GRIERSON, R., 1930. Clyde Casuals. *Glasg. Nat.* 9:1-51.
 HOPKIRK, T., 1813. *Flora Glottiana*. Glasgow.
 LEE, J. R., 1933. *Flora of the Clyde Area*. Glasgow.
 PERRING, F. H. & WALTERS, S. M., 1962 *Atlas of the British Flora*. London & Edinburgh.
 STACE, C. A., 1991. *New Flora of the British Isles*. Cambridge.

Zoological

***Keroplatus testaceus* Dalman (Diptera; Mycetophilidae), another Scottish record** E. G. HANCOCK

While on field work during a dipterists' recording scheme meeting, based at Stirling University in 1992, I swept an example of the fungus gnat *Keroplatus testaceus* in part of Craigmore Wood, near Aberfoyle (V.C.87), on 19 June, 1992. I have only seen this species once before, in the south of England, but its flattened antennae and strong yellow brownish body are distinctive. Although this was in the company of Peter Chandler who was reviewing the species, his paper had gone to press and so the record could not be added (1993, *Entomologist's Monthly Magazine*, 129: 61-65). The previous year he had found it for the first time in Scotland at two localities in the north, on Skye and in Wester Ross. The specimen from Aberfoyle fills the gap equally between these latter records and the previous most northerly one from Cumbria. As the larvae of this attractive fly are associated with bracket and other fungi on a variety of trees it ought to be generally distributed.

The mayfly *Heptagenia fuscogrisea* (Retzius) in Ayrshire C. R. DOUGHTY

On 24 February 1993, a single nymph of the mayfly *Heptagenia fuscogrisea* was taken in a kick sample of benthic macroinvertebrates collected from the Cammock Burn at Darnaconnar Bridge (NX 272830) near Barrhill, Ayrshire (V.C.75), by Clyde River Purification Board biologists. The common *H. sulphurea* (Müller) was also present. *H. fuscogrisea* is regarded as nationally notable. It is known from Berkshire, Northamptonshire and Yorkshire, but in Scotland the only previous records are from the River Bladnoch and Cree catchments in Wigtownshire (Dr D. Randall, pers. comm.). The species is more common in Ireland.

H. fuscogrisea is found in stony streams, rivers and lakes. In Britain, the flight period is May and June. Most British records are from calcareous areas, but those from Scotland are from acid, peaty waters. The Cammock Burn certainly falls into the later category. It is a peaty upland stream subject to frequent acid episodes. Swedish work suggests that among the mayflies, *H. fuscogrisea* is relatively tolerant of acid conditions, being found down to at least pH5.0. About 1km downstream of Darnaconnar Bridge, the burn, now known as the Feoch Burn, enters Feoch Meadows SSSI. It is possible that further sampling will turn up specimens within the SSSI boundary.

**Leaf-cutter bees *Megachile willughbiella* Kirby,
at Waulkmill Glen, Darnley, Glasgow**

E. G. HANCOCK

Around a large fallen elm tree near the Brock Burn at Waulkmill Glen on the 31 August 1993 a number of leaf-cutter bees were seen. Their nests were under the bark and the characteristic cut-outs from leaves of roses (*Rosa* ssp. were also prominent nearby. A specimen was caught and identified as *Megachile willughbiella*, a species for which a small number of Scottish records exists. As usual when examining the distribution of aculeate Hymenoptera for the Clyde area, the paper by Clark (*Kilmarnock Glenfield Ramblers Association Annual Report, 1907-1910*) gives the most detailed account, but it deals only with Ayrshire.

This seems to be the first time this species has been seen in Glasgow although gardeners may well be familiar with the damage caused to rose leaves. The bee does not distinguish between wild plants and cherished cultivars. I would be interested to hear from anyone who has seen such evidence as shown in the silhouetted illustration (Fig. 1). There are two other species of leaf-cutter bee which have occurred in Scotland and there are differences in choice of nest site as well as in the anatomy of the insects themselves.

M. willughbiella is normally found in rotten willow trees so the particular situation at Darnley may be the result of a supply of dead elms in the absence of willows with the right sort of decay. It may be of interest that the cells were in the thickness of the bark and not in the timber of the tree, which remained sound.



Fig. 1 Leaves of roses characteristically damaged by Leaf-cutter bees. Oval shapes are used for the body of the cell, round ones for the end caps.

***Bombus lapidarius* (Linn.) (Hymenoptera; Apidae),
the red-tailed bumblebee**

E. G. HANCOCK

Despite the poor weather of the summer a number of red-tailed bumblebees (*Bombus lapidarius*) were seen during the year. It is an unmistakable insect in a Scottish context because no other species has a queen which is all black but with a red tail. My sightings were at Arniston (Midlothian, V.C.83, 22 May 1993) and Sandford (Lanarkshire, V.C.77, 28 June 1993). Specimens were brought into Glasgow Museum & Art Gallery, Kelvingrove, from Robroyston V.C.77, (28 August 1993) by Bernard Zonfrillo.

The national survey indicates a lack of records in Scotland for *B. lapidarius* (*Provisional Atlas of the Insects of the British Isles, part 3, Bumblebees*, 1973) which is reflected in the text of recent literature (e.g. *Naturalists' Handbook No. 6, Bumblebees*) and it is hard to imagine that such a prominent insect could be under-recorded. However, the number of resident or visiting naturalists active in entomology is small. Also, historical records for it are numerous for south-west Scotland and the Clyde area at least up to the 1920s. Unless a dramatic but unobserved withdrawal has taken place locally in the last 70 years, it may be that it has been here all along although possibly in smaller numbers. Perhaps a detailed scrutiny of collections and publications, supported by the memories of local naturalists would fill in this gap, if there is one. There are Scottish specimens in Glasgow Museum & Art Gallery from Southernness (Kirkcudbrightshire, V.C.73, 4 August 1982) and Barnes Ness (East Lothian, V.C.82, 19 June 1976) apart from early twentieth century material.

**Red-eared Terrapin at Loch Ardsinning,
Milngavie (V.C.86)**

THOMAS P. DANIELS

On 26 March 1993, in company with Mr James Tarbet, I found a dead Red-eared Terrapin *Trachemys scripta* (Schoepff) a short distance from the water's edge on the south-east side of Loch Ardsinning, near Milngavie, Glasgow. The carapace was around 150mm long, and intact, but the extremities had been chewed away by a fox or other predator. The terrapin could not be sexed with any certainty as the tail had been lost. In this species the tail of the male is larger and heavier than that of the female. The carapace fell between that of a large male and a small female.

Red-eared Terrapins are native to the Americas and are commonly sold as pets. In parts of south-east England they have apparently

become established at several locations due to liberation from captivity. In their Canadian range the species can withstand winter temperatures much more severe than those in Scotland. The comparatively mild winters may in fact interfere with hibernation patterns. This individual may have emerged prematurely on a mild day from winter hibernation. With a largely carnivorous diet, the Red-eared Terrapin, if it becomes established, would be much to the detriment of newts and other amphibians.

Slow-worm active in December

THOMAS P. DANIELS

While on a walk with a school party over Conic Hill, Balmaha (V.C.86) on 20 December 1992, Mr James Tarbet found a male Slow-worm, *Anguis fragilis* Linn., moving sluggishly over the road verge near Balmaha. The hibernation period for Slow-worm is given by Smith (1951, *The British Amphibians and Reptiles*, Collins New Naturalist) as October to March, although there are a few records of them emerging in fine mid-winter weather in the south-east of England. Mr L. Brown, keeper of Reptiles at Glasgow Zoo observed that finding a Slow-worm in winter in Scotland required particularly mild weather. The weather on 20 December 1992 was very mild and sunny and probably revived the hibernating Slow-worm. On Ailsa Craig, where the Slow-worm is abundant, Mr B. Zonfrillo has recorded a pair above ground on 16 February 1993. Frosty weather is an exception on Ailsa Craig in winter.

Ray's Bream at Ardrossan North Beach

ROGER S. LI. GRIFFITH

On Tuesday, 24 September 1993, an ex-pupil of Ardrossan Academy brought in to the school a most unusual looking fish for identification. The fish was superficially similar in appearance to the renowned Piranha and had just been caught that morning at Ardrossan North Beach. The angler concerned, Brian McColl, had been fishing with a rod and line, employing a spinner rather than a baited hook.

The incident was reported in the national and local press and created a great deal of interest. A bizarre aspect of the incident was that the fish appears to have beached itself having attacked and chased the angler's dog up the beach whilst hooked.

The specimen was identified by Peter Clark of the Scottish Environmental Education Council (SEEC) as being Ray's Bream, *Brama brama* (Bonnaterre 1788). The Ardrossan example was 35cm long, toothed, deep-bodied with a very steep profile, laterally flattened

and with a characteristic long and curved tail fin. The back was a dark greeny brown, the sides silvery and the fins dark-edged, the pectorals yellow.

Ray's Bream is a mid-water fish usually found off the Spanish coast and south to Madeira. It annually spreads northwards and occurs in varying numbers in Northern European waters, especially in the winter months.

The *Clyde Fauna Catalogue* of Glasgow Museum only records three specimens, one from Lewis in 1957, another from Skye in 1956 and an old record from near Ayr, recorded in the *Catalogue of the Anderson's University* (Strathclyde University) as having been purchased in 1865.

I am indebted to Richard Sutcliffe, Curator at the Kelvingrove Museum for confirming the identification and for furnishing me with records and further details of Ray's Bream.

Sea Lamprey, *Petromyzon marinus* L. in the River Clyde

C. R. DOUGHTY

On 29 June 1993, an angler notified the Clyde River Purification Board that on the previous day he had found an unidentified fish dead in the River Clyde at Cambuslang (NS 637614). From the description, it appeared that the mystery fish was a sea lamprey and this was confirmed on examining the specimen, which by then was badly decomposed. It was a male of around 75cm.

Sea lampreys spend their early lives as ammocoete larvae in silty areas of rivers and lakes, feeding on microscopic algae and protozoans. After about five years, the larvae metamorphose and migrate to sea, where they parasitize a variety of fish species. Adults migrate back into the rivers in spring to spawn in shallow water over sandy gravel, usually in May or June. All lampreys die after spawning. Since the stretch of the Clyde where the lamprey was found seemed to be good spawning habitat, it is likely that this particular specimen died after spawning, although it was not possible to confirm this owing to its decomposed state.

In the Clyde area, sea lampreys are found mainly in Loch Lomond, the River Endrick and the River Leven. The River Leven is known to be an important spawning area. There is a further record from the River Eachaig (Maitland, 1980, *Glasg. Nat.* 20:35). As sea lampreys are intolerant of pollution, the occurrence of the species in the Clyde provides further evidence of an improvement in water quality in recent years.

Gilthead

R. SUTCLIFFE

A single specimen of a Gilthead, *Sparus aurata* Linnaeus, was caught by an angler fishing off the beach at Port Logan Bay, Wigtownshire (V.C.74) in July 1993. The fish, which weighed approximately 2lb 8oz (1.135kg), was offered to the Port Logan Fish Pond, where it was still alive in October 1993.

This particular species of sea bream is usually found in the Mediterranean and in the Atlantic south to the Canaries, and is very rare in northern waters, being especially sensitive to cold.

Recovery of a ringed Cormorant

M. J. McGEE

I found a dead cormorant, *Phalacrocorax carbo* (L.) on 18 March 1993 at the confluence of the Kelvin and Clyde. The bird had an injury to its neck. The weather during the previous night had been very stormy.

The bird had been fitted with a BTO (British Trust for Ornithology) ring bearing the number 5149203 and when the find was reported to the BTO it was established that the bird had been ringed as a nestling on Little Ross Island in Kirkcudbright Bay, Solway Firth, on 27 June 1991 by the North Solway Ringing Group.

Photograph acknowledgments:

Plates 1, 2, 3 – B. Zonfrillo.

Plate 4 – Courtesy of Royal Mail.

Plate 5a – T. Norman Tait.

5b – W. Parkes.

5c – Allan McG. Stirling.

Software Review

The *Hypercard* Guide to the Parkhouse Community Nature Reserve, Ardrossan

ROGER S. LL. GRIFFITH

Disc and Hard Copy, ISBN 1 85098 507 3.

This guide to the nature reserve takes the form of a *Hypercard Stack*. *Hypercard* is a programme for the Apple Macintosh computer and for this purpose can be thought of as an interactive learning programme.

In order to get the most out of the programme it helps if you are familiar with the Apple Macintosh computer.

The programme is not difficult to use, in fact it is quite fun. There are two stacks on the disk. One is an introduction to the site and the other is a guide to the actual site itself.

The stacks are opened by double-clicking on the *Hypercard Stack* icon. Once the stack is open you move through the programme by clicking on various parts of the screen (usually arrows) and following on-screen instructions. There is animation and sound effects associated with some of the buttons.

Parkhouse Reserve occupies land that was once part of the Lanarkshire and Ayrshire Railway and the stack echoes this in its design by taking the form of a railway line with various junctions with lead off to deal with such things as the geology of the site, plant life on the site, the habitats of the site, educational activities available on site etc.

The stack contains a lot of very useful information including maps of the site, and lists of all the various species found on the site. As well as all this, if you know anything about *Hypercard*, it is possible to add your own information to the stack. The author has no objections to this as long as there is no alteration to the author's name and the various credits.

The stack has been written by the Principal Teacher of Biology at Ardrossan Academy and is designed to be used by pupils from primary 6 upwards as well as anyone interested in the reserve. As well as giving information about the site it can also be used as an introduction to Computer Assisted Learning and may even give others ideas for creating *Hypercard Stacks* about some feature of their local environment.

An annoying aspect of the stack design is the fact that the arrow buttons are not duplicated exactly on each card of the stack and at first glance it appears as if you need to reposition the mouse every time you want to move on to the next card. On closer inspection, however, this doesn't really matter in practice as the invisible boundaries of each button are large enough not to require repositioning of the mouse every time, even though the pointer falls outside the arrow icon. Another feature that distracts from the flow of the programme is the fact that after travelling up some of the many branch lines you have to backtrack down it to rejoin the main line.

These are minor irritations and in no way detract from what is an excellent use of *Hypercard*. For anyone interested in the site, or anyone who is interested in finding out what can be done with *Hypercard* at a very basic level, the stack is well worth having a look at.

As a bonus the disk also comes with a version of the *Five Kingdoms Database* designed to be used with Microsoft Works. It provides a cross-reference of common and latin names of 7000 animals and plants.

The package is available from the Sales and Publicity Office, University of Strathclyde, Jordanhill Campus, 76 Southbrae Drive, Glasgow, G13 1PP.

Book Reviews

Junior Nature Guides

Seashells of Great Britain and Europe. ISBN 1 85028 218 8
R. TUCKER ABBOT.

Trees of Great Britain and Europe. ISBN 1 85028 219 6.
ALAN MITCHELL.

Wild Flowers of Great Britain and Europe. ISBN 1 85028 220X.
PAM FOREY.

Rocks and Minerals of the World. ISBN 1 85028 217X.
MICHAEL O'DONOGHUE.

Dragon's World Children's Books, London, 1993, 80pp each,
many colour illustrations. Hardback, £7.95 each volume.

These books are intended to be used by children as reference books when they explore the natural world. In addition to offering a method for identifying specimens, each volume has interspersed more general information with a conservation slant, and suggestions for activities.

There is quite a bit of reading for the average 8 to 10 year old to do, perhaps on a wet day, before the reference section can be used properly. Otherwise the young user, like many of the rest of us, will be tempted merely to thumb through the pictures looking for the closest match to the specimen being identified.

The photographs in "Seashells" are superb, but what a pity that the museum numbers that can be seen so clearly on many of the specimens are not mentioned at all in the text, even in the section "Keeping a record".

I found "Trees" very useful indeed in my attempts to identify some of the ornamental trees in our parks. The pictures are clear, the text straightforward, the information useful and the activities sound fun. If I have a grouse at all, it would be that the warnings about eating poisoned parts are not obvious enough. On the other hand I feel sad that children should be discouraged from climbing trees.

I suspect "Wild Flowers" will sell best, and it does fill the gap for a child-friendly guide to our commonest flowering plants. It would be better to have a "Don't pick" prohibition beside each particular "endangered" plant rather than a blanket ban at the beginning which hardly applies to say, the Common Ragwort. What a pity that the pictures of Meadowsweet and Fool's Watercress got reversed on page 63.

My favourite of this quartet is "Rocks and Minerals". Though probably least likely to be used for identifying — diamonds, pectolites and almandines are not so often found by Scottish schoolchildren — as a book for browsing through it is hard to beat.

The symbols by the pictures in all but the last mentioned, indicating size in the first two and flowering time in the third surely mean less than words can say. An irritating feature is the omission of page numbers on most of the non-reference sections.

WATCH, the junior section of the Wildlife Trust, have endorsed this series. I agree to the extent that the books will prove invaluable to adults who want to encourage children to find things out for themselves. However, they will need to guide the youngsters in how to use them.

LYN DUNACHIE

Book Review

British Freshwater Crustacea Malacostraca: A Key with Ecological Notes. Freshwater Biological Association, Scientific Publication No. 52.

T. GLEDHILL, D. W. SUTCLIFFE and W. D. WILLIAMS
Freshwater Biological Association, 1993, 173 pages, many line drawings. Softback, ISBN 0 900386 53 3, £12.

The Malacostraca is that subclass of crustaceans that include crabs, lobsters, sandhoppers and woodlice. The best-known freshwater malacostracans are the crayfish and the so-called freshwater shrimps (gammarid amphipods), the latter also being the ones that are encountered most frequently by the amateur biologist. This volume is a revised version of the authors' 1976 key (FBA Scientific Publication No. 32), but it has been improved greatly: a pictorial introduction has been added which shows a representative species of each of the main malacostracan orders and families; the notes taxonomy, distribution and ecology have been expanded significantly; and the bibliography has been updated thoroughly. In fact the modest subtitle of this volume – "A Key with Ecological Notes", belies the wealth of information it contains.

The key itself is completely new. The crayfish section, for example, has been modified to include all of the non-native species that have been imported "for culinary purposes". The keys to individual groups are preceded by helpful notes on general biology, distinguishing features and nomenclature. These notes also draw attention to potential difficulties and provide advice for the beginner. Key characters are illustrated in numerous line drawings which are mostly adjacent to the relevant text, so that a minimum amount of page-turning is required. Of course, the greatest difficulty facing the non-specialist using any key for the first time is anatomical terminology. There is no easy way round this, but the problem is always alleviated by the inclusion of good illustrations, as is the case here. The keys are definitely user-friendly.

The general notes on taxonomy, distribution and ecology form a single section that follows all the keys. They provide an excellent introduction to the biology of the British freshwater malacostracans. This book will therefore be useful to both those wishing to identify animals and those simply seeking information on their distribution or habits. It can be recommended without reservation to amateur and professional biologist alike.

I. C. WILKIE

The Encyclopedia of Land Invertebrate Behaviour

ROD and KEN PRESTON-MAFHAM

Blandford, London, 1993, 320 pp., 215 colour photographs, 41 line drawings. Hardback, ISBN 0 7137 2196 0, £30.00.

This is a substantial and serious book, intended for both amateurs and professionals. Although entitled "Encyclopedia", the authors make it clear that the coverage is not comprehensive but explores selected aspects of land invertebrate behaviour, often in depth.

Five aspects are covered, Sexual Behaviour, Egg-laying Behaviour, Parental Care, Feeding Behaviour and Defensive Behaviour; the matter in the first four sections being presented in systematic order, that in the last according to topic. In many, but unfortunately not all cases, topics are supported by original references. Fine colour plates and informative line drawings greatly enhance the text. There is a substantial bibliography (c. 850 titles), almost all from English language sources, and there is an index of common names as well as a general one.

The text is mostly written in plain English with scientific terms kept to a minimum. At times this has been overdone; terms such as "samurai butterflies" and "Lolita flights" have no place in serious literature. Also "presumed" reasons for behaviour patterns make no contribution to scientific knowledge.

These minor objections apart, this handsomely produced volume contains a wealth of information and as a source book should remain of value for many years.

RONALD M. DOBSON

The Really Wild Guide to Britain

ERIC ROWAN and DAVID WALLACE

BBC Books, 1993, 287 pp., 14 maps, line drawings.
Softback, ISBN 0 563 36788 1, £5.99.

This paperback is a directory, divided into the UK Regional Tourist Boards, that attempts to give comprehensive information on country parks, National Trust sites, nature reserves and the like. Enormous gaps of information occur in the part of the book that refers to the west and south-west of Scotland, e.g. Culzean Country Park does not merit a mention. Consequently one wonders how many omissions exist with regard to the rest of Britain. In the key to maps, Cumbria and the north-west of England are transposed.

By no stretch of the imagination could this guide be described as comprehensive. Nonetheless, the book is based on a TV series that was apparently watched by millions, and so it may be a popular purchase. The authors' claim that they wish to encourage readers "to go out and really enjoy wildlife". A local Ordnance Survey map, together with a Tourist Board publication would probably enable one to achieve this end better than possession of this book. Still, at the price, it is not a book to be ignored completely and for the visitor to some areas it could form an inexpensive addition to his/her booklist.

ROBERT GRAY

Field Guide to Mammals of Britain and Europe

DAVID MACDONALD and PRISCILLA BARRETT

Harper Collins, London, 1993, 312 pp., 64 colour plates (over 600 paintings), over 200 maps. Hardback, ISBN 0 00 219779 0, £14.99.

This book appears to combine the earlier Collins guides *A Field Guide to the Mammals of Britain and Europe* and *Guide to Animal Tracks and Signs*.

Over 200 species are described. Not only are there detailed descriptions of the mammals complete with distribution maps but there is also information relating to their feeding habits, tracks etc. More radically there is an identification table of the call characteristics of the whale species. Bat call characteristics are also tabled but of course these must be identified using a bat detector. Another interesting aspect of the book is the explanation of the meanings of the scientific names.

A cursory glance through the book identified one or two minor points which I find unsatisfactory. The Red Squirrel (*Sciurus vulgaris*) description describes the U.K. race being adapted to native Scots Pine, although the distribution map shows no Red Squirrels in Scotland or England. The Bottle-nosed Dolphin (*Tursiops truncatus*) is described as being found throughout the Atlantic, which is correct but perhaps a more useful description could have indicated the Moray Firth and Cardigan Bay as more specific locations.

In conclusion, an excellent buy at £14.99.

IAN McCALLUM

Echo of the Elephants: the Story of an Elephant Family

CYNTHIA MOSS with photographs by MARTYN COLBECK.

BBC Books, 1992, 192 pp., colour photographs, map.

Hardback, ISBN 0563 360 941, £16.95.

Covering the seasons between January 1990 and June 1991 the book tells of a year in the lives of elephants in the Amboseli National Park in Kenya. The main characters in the book are Echo and her son, Ely.

It was impossible not to feel for the observers, following a policy of non-intervention, as they watched Ely, born with the medical condition of "flexure of the pasterns" struggle to learn to walk. The patience of his mother, Echo, could only be admired.

There were fascinating insights into the matriarchal society of elephants, their attitude to the death of an elephant and to one which was stillborn. The breeding cycle of elephants was also described in detail.

This well-written and easily-read book is beautifully illustrated by colour photographs which are well captioned. There is a good index and it is obvious that much painstaking research has been done by the author. This book is well worth buying.

MARGARET M. H. LYTH

Kingfisher

PAULO FIORATTI (translated by SYLVIA SULLIVAN)
Harper/Collins, London 1992 144p, 110 colour photographs.
ISBN 0 00 219957 2, £16.99.

Everything you could ever wish to know about the European Kingfisher, and much more, is included in this lavishly illustrated book. The high quality reproductions of Paulo Fioratti's superb photographs cover every aspect of the Kingfisher's biology including pictures taken of the birds tending their young in the nest burrow. Particularly impressive are the shots of the Kingfisher diving and fishing underwater. Although this type of intimate view of the Kingfisher has been photographed by other naturalists, I believe this is the first time a picture book has been devoted entirely to this species.

The first two sections cover the origins, distribution and geographical variations of Kingfisher throughout the world. This is followed by definitive chapters on habitat, movements, population and mortality, territory, antagonistic behaviour, colours and mimicry, food and feeding habits and breeding. Paulo Fioratti's text presents a wealth of detailed information based on his personal observations and studies. He has also collated various statistics produced by scientific studies conducted throughout Europe and presents them in a readable manner. The work reflects a great love and personal involvement with Kingfishers.

Although this publication is basically a pretty picture book, it is well worth having for it contains a lot of useful reference material — just in case you have the good fortune to encounter this beautiful bird around Glasgow!

T. NORMAN TAIT

Advertisement

Lee, J. R. 1933 *The Flora of the Clyde Area*

Professionally bound copies of the original printing of this Flora can now be provided to order, price £7.50 to members of the *Glasgow Natural History Society* and to the book trade, £10.00 to others (p. & p. £1.00 extra). This is still the only work of its type on the area and is in diminishing supply.

Obtainable from *The Librarian* at the address given on the inside of the back cover.

Proceedings 1992

The chairman, place*, number present, lecturer's name, title of lecture and note of any exhibits are given for most meetings.

*GMK: Glasgow Art Gallery and Museum, Kelvingrove

UGBD: University of Glasgow, Botany Department

- 7 JANUARY.** Mr E. G. Hancock, GMK, 50+.
Mrs Winifred Brown: Nature Section of 23rd Paisley International Colour Slide Exhibition.
Slides prepared and shown by Mr T. N. Tait.
- 11 FEBRUARY.** Mr E. G. Hancock, GMK, 51. 62nd A.G.M.
Sidney Clark, photographer for Royal Botanic Gardens, Edinburgh.
"Plant Photography" introduced by Mr T. N. Tait.
A.G.M. Activities during 1991 were reported, elections held and appointments by Council announced, (see page 442).
At the end of 1991 there were 220 ordinary members, 29 family, 3 junior, 3 school and 9 honorary, making a total of 264. Since New Year this rose to 270.
There were 3 Council meetings and the Executive met informally as required.
There had been 8 meetings in Kelvingrove Museum, a June Outing and an Annual Dinner. 16 Excursions were arranged for the summer months.
Professor Lloyd Binns, a past member of the Society, who died this year has bequeathed a substantial sum of money to the Society.
- 10 MARCH.** Mr E. G. Hancock, GMK, 50.
An Evening with Insects.
Video of Ailsa Craig, Janet McGregor.
- 14 APRIL.** Mr R. Sutcliffe, GMK, 55.
Miss Margaret Reilly, Trinidad and Tobago.
Exhibit: Slides of Otter, River Kelvin, Richard Sutcliffe.
- 12 MAY.** Mr E. G. Hancock, GMK, 37.
Gordon Rothero, Mosses and Liverworts.
Plant Sale.
- 18 SEPTEMBER.** Exhibition and Cheese and Wine Party, GMK.
Special exhibit of River Kelvin.

13 OCTOBER.

Mr E. G. Hancock, GUBD, 55.

Members Slide Night, introduced by Mr T. N. Tait.

N. Grist, Slugs; R. Sutcliffe, Butterflies; W. Parkes, Orchids; E. Stewart, Nepal; A. Wilson, Alaska; M. Lyth, Arran and Bass Rock; J. Lyth, GNHS Outings; K. Cohen, Senegal; P. Macpherson, Canadian Prairies; J. Millar, River Kelvin; T. N. Tait, Iceland.

Amendments to Constitution passed at this meeting.

12 DECEMBER.

Annual Dinner, Kelvin Park Lorne Hotel.

Peter Macpherson, Plants now growing on site of Glasgow Garden Festival.

Officers and Council SESSION LXII 1992

- President:* E. Geoffrey Hancock, B.Sc., F.M.A.
- Vice-Presidents:* Mrs Elspeth L. S. Lindsay, M.B., Ch.B.,
F.R.C.R.
Ronald M. Dobson, M.A., Ph.D.
Prof. N. R. Grist, B.Sc., M.B., Ch.B., F.R.C.P.,
F.R.C.Path
- Councillors:* Iain C. Wilkie B.Sc., Ph.D.
Mrs June P. McKay
Mrs Agnes Walker, B.Sc., M.Sc., Ph.D.
Keith Watson, B.Sc.
Ms Mary M. Child, B.Sc.
Mrs Alison Moran, B.Sc.
Jonathan Moran, B.Sc., Ph.D.
Andrew Wilson
Carol Aitken, B.Sc., M.Sc.
- General Secretary:* Mrs Jean M. Millar, M.A., M.I.Biol.
- Treasurer:* Robert Gray, B.Sc., M.I.Biol.
- Librarian:* Mrs Ruth H. Dobson, B.Sc. M.Sc.
- Editor:* Ronald M. Dobson, M.A., Ph.D.
- Conveners of Sections:* Keith Watson (*Botany*)
Richard Sutcliffe (*Geology*)
T. Norman Tait (*Photography*)
E. Geoffrey Hancock (*Zoology*)
- Auditors:* E. T. Watt
Martin Brown
- Assistant Secretaries:* Keith Cohen (*Fund-raising and Publicity*)
Richard Sutcliffe (*Membership*)
Mrs Howella McDonald (*Social*)
- Newsletter Editor:* Lyn Dunachie
- Editorial Board:* The Editor
Allan McG. Stirling
James H. Dickson
I. C. Wilkie
- Representative:* Mrs Edna Stewart (S.W.T.)

The Glasgow Naturalist

This publication is included in the abstracting and indexing coverage of the Biosciences Information Service of *Biological Abstracts* and in that of CABS (Current Awareness in Biological Sciences).

The following back numbers are available for purchase in their separate parts:
Vols. II-VIII (1890-1918); Vols. XIII-XXII (1937-1993)

Of the earlier journals the only parts available are:

The Annals of the Andersonian Naturalist's Society Vol. IV, pt. 3.
Proceedings and Transactions of the Natural History Society of Glasgow
Vol. I, pt. 3; Vol. II, pts. 1 & 2; Vol. VI, pts. 1 & 2; Vol. VII, pt. 3;
Vol. VIII, pts. 1 & 2.

Enquiries regarding prices of and orders for any of the above, or for reprints or photocopies, should be addressed to *The Librarian*: –

Mrs R. H. Dobson, 7 Netherburn Avenue, Glasgow, G44 3UF.

Advice to Contributors

Contributions, except *Short Notes*, should be sent to *The Editor*: –

Dr R.M. Dobson, Zoology Department, Glasgow University, Glasgow, G12 8QQ;
Short Notes should be sent to Mr A. McG. Stirling, 17 Austen Road, Glasgow, G13 1SJ.

Articles, preferably typed doubled-spaced, should conform to the format of the journal as regards layout, use of capitals, punctuation etc. Script should be of uniform size and format (no bold lettering) and passages to be italicised should be underlined. Titles of journals should be abbreviated according to accepted conventions e.g. as in *World List of Scientific Periodicals*. Samples of format can be supplied on request.

5 in. or 3½ in. computer discs may be sent in addition to typescripts. These should be produced as *Wordperfect*, *Ascii* or *Text Only* files devoid of all printing instructions.

Drawings, graphs etc. should be designed to utilise page space (166 x 109mm) economically and line thickness, shading, lettering etc. should allow for any necessary reductions. Monochrome and colour photographs (preferably transparencies) may be acceptable. Maps should be “boxed” and include scale lines and indication of North.

The journal is usually issued in mid-February each year and, unless prior arrangements have been made, the deadlines for receipt of papers and for *Short Notes* are, respectively, 30 September and 31 October of the previous year.

Ten free reprints are issued with each paper. Further copies may be purchased if required.

Contents

Page

- 307 The Flora of Ailsa Craig, BERNARD ZONFRILLO.
- 344 Book Reviews: Flowers of Iona, 2nd edition, J.S. MILLAR.
- 345 Scottish Orchids as Postage Stamp Designs, MARY BATES & J.H. DICKSON.
- 349 Ten Years of Population Counts of Orchids at Dumbrook Loch Meadows, Stirlingshire and Problems of Management, C.A. DICKSON & W. PARKES.
- 361 Improving the Quality of Poorly-pressed Herbarium Specimens, P. MACPHERSON.
- 364 Book Review: Wild Orchids of Scotland, B. ALLAN, P. WOODS & S. CLARKE.
- 365 The Inchlonaig Yews: their Tree Epiphytes and their Tree Partners, N. PILKINGTON, J. PROCTOR & K.J. REID.
- 374 Book Review: Eric Hosking's Classic Birds — 60 years of Bird Photography, J. FLEGG & D. HOSKING.
- 375 Dental Loss, Disease and Abnormalities in Scottish Red Foxes, M. HANCOX.
- 378 Book Review: Collins Field Guide: Birds of Britain and Europe, New Ed., R.T. PETERSON, G. MOUNTFORD & P.A.D. HOLLLOM.
- 379 Bovine Tuberculosis and Scottish Wildlife, M. HANCOX.
- 381 Insect Records from the West of Scotland in 1992, E.G. HANCOCK.
- 385 Some Leaf-mining Diptera from North Uist, Outer Hebrides, K.P. BLAND.
- 387 Book Review: Bird Life of Coasts and Estuaries, P.N. FERNS.
- 388 Book Reviews: The Ecology of Butterflies in Britain, R.L.H. DENNIS (Ed.); Collins Field Guide: Insects of Britain & Northern Europe, 3rd. edition, M. CHINERY.
- 389 The Clouded Yellow Invasion of Scotland, 1992, R. SUTCLIFFE.
- 396 Book Review: Insects in Flight, J. BRACKENBURY.
- 397 Underground Glasgow: a Study in Environmental and Urban Impact, B.S. SKILLEN.
- 408 Book Reviews: The Great Tit, A. GOSLER: Seabirds, R. HUME & B. PEARSON.
- 409 Distribution and Species and Length Composition of Wrasse (Labridae) in Inshore Waters of West Scotland, J.W. TREASURER.
- 418 Book Reviews: Insects of the Northern Hemisphere, G.C. McGAVIN: Bird Migration, R. BURTON.
- 419 Short Notes: A. McG. STIRLING (Compiler).
- 434 Soft-ware Review: The Hypercard Guide to the Parkhouse Community Nature Reserve, R.S.LI. GRIFFITH.
- 435 Book Reviews: Seashells of Great Britain & Europe, R.T. ABBOT: Trees of Great Britain & Europe, A. MITCHELL; Wild Flowers of Great Britain & Europe, P. FOREY: Rocks & Minerals of the World, M. O'DONOGHUE: British Freshwater Crustacea Malacostraca, T. GLADHILL, D.W. SUTCLIFFE & W.D. WILLIAMS: The Encyclopedia of Land Invertebrate Behaviour, R. & K. PRESTON-MAFHAM: The Really Wild Guide to Britain, E. ROWAN & D. WALLACE; Field Guide to Mammals of Britain & Europe, D. MACDONALD & P. BARRETT: Echo of the Elephants: the Story of an Elephant Family, C. MOSS & M. COLBECK: Kingfisher, P. FIORATTI (translated S. SULLIVAN).
- 439 Advertisement: *The Flora of the Clyde Area*, by J.R. Lee (1933).
- 440 Proceedings 1992.
- 442 Officers and Council, SESSION LXII, 1992.

520 PA AL

10/05/95 198115







SMITHSONIAN INSTITUTION LIBRARIES



3 9088 01205 4292